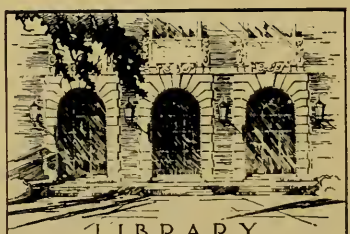

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CATALOGUE OF MAMMALS

COLLECTED BY

E. HELLER

IN

SOUTHERN CALIFORNIA

BY

D. G. Elliot, F. R. S. E., Etc.

Curator of Department.

Chicago, U. S. A.

March, 1904.

CATALOGUE OF MAMMALS COLLECTED BY E. HELLER IN SOUTHERN CALIFORNIA.

BY D. G. ELLIOT, F. R. S. E., ETC.

On his return from the expedition into the San Pedro Martir Mountains in Lower California, Mr. Heller was instructed to continue collecting in the Colorado and Mohave Deserts, Death Valley, and the various mountain ranges in the vicinity of these, visiting as many as possible of the type localities accessible on his proposed route. In pursuance of the course indicated for him to follow, he commenced his labors in February, 1902, at Whitewater, where four days were passed. This place is fifteen miles from Palm Springs and at the eastern terminus of San Gorgonio Pass and the extreme western end of the Colorado Desert at an elevation of 12,000 feet, and here topotypes of *Dipodomys m. similis=D. m. simiolus*, were procured. "The vegetation about Whitewater is almost wholly that of the Lower Sonoran of the desert. The creosote bush, the characteristic species, is abundant about the ranch and to the west as far as Cabezon, ten miles from the mouth of the Pass. The mesquite, *Prosopis juliflora*, extends westward to the same limits as the creosote. A small tree yucca, *Y. mohavensis*, is abundant, and forms a conspicuous part of the vegetation."

From Whitewater Mr. Heller went to Palm Springs, a village on the Colorado Desert situated in a cave of San Jacinto Mountain and about fifteen miles east of Whitewater. "The desert at this place," writes Mr. Heller, "is a level plain of white sand, recently a bed of the arm of the Gulf of California, but now 4,000 feet above sea level, from which the mountains rise abruptly in some places, forming cliffs, and the mouths of the cañons are marked by great alluvial fans which rise a considerable height above the plain. Although so close to Whitewater, the conditions are much more those of the desert, and the heat in summer is extreme. The Lower Sonoran Zone spreads out over the entire desert and reaches into all the cañons, and ascends the sides of the hills as high as 3,000 feet. The creosote bush grows here to large proportions and forms a continuous belt from the lower hills well out into the desert. The mesquite, *Prosopis juliflora*, and the desert willow, *Chilopsis linearis*, are generally dis-

tributed along dry washes, in some places forming thickets of large extent. On the rocky hillsides and mesas bordering the more sandy portions of the desert cacti are abundant, chiefly cholla, *Opuntia tesselata* and *O. echinocarpa*, a species of *Cereus*, and the barrel cactus, *Echinocactus*. In the cañons the fan palm, *Neowashingtonia filamentosa*, forms the most conspicuous part of the vegetation, associated with which are willows, cottonwoods, sycamores, screw-pod mesquite, and low thickets of *Acacia*. Farther up the cañons, at 2,000 feet, occur the juniper, piñon pine, and agave, while a few *Yucca mohavensis* occur at the mouths of the cañons. Owing to the abruptness of the mountains and the low elevation of the plain upon which they rest, the coast and mountain flora and fauna are brought down into close contact with forms which are characteristic of the lowest part of the desert." A *Citellus* and a *Perognathus* are described as new from this locality and topotypes of *Dipodomys m. simiolus*, *Perognathus p. bangsi*, *Nyctinomus femorosaccus*, and *Neotoma bella* were obtained.

From Palm Springs Mr. Heller traversed the Morongo Pass through the San Bernardino Range to its northern side. This Pass which "marks the eastern boundary of the valley, has an elevation of 3,000 feet, and the valley itself is about 500 feet lower, and forms a connection between the Colorado Desert and the southwestern arm of the Mohave Desert. The valley is about ten miles in length, with a width of two or three miles, and has a gravelly floor and rolling surface, due to the washes of the several creeks which cross it at right angles to break through the low hills on the southeast to the Colorado Desert. The valley is in the Lower Sonoran Zone, being covered by a pure growth of creosote in many parts. *Yucca mohavensis* is also an abundant species and here reaches its maximum dimensions. To the south, the Pass is walled in by San Jacinto Mountain, which rises very abruptly from the level floor of the desert to a height of 10,805 feet. The San Bernardino Mountains form the northern wall, the highest peak lying less than fifteen miles to the north and attaining an altitude of 11,485 feet. At Whitewater, the mouth of the Pass is a little more than two miles in width, with a gradual decline eastward to the desert. To the west it keeps its broad, open character and gradual ascent to the summit, 2,600 feet, a few miles west of Banning, where one day was passed and a few specimens procured. Near Whitewater the Pass is filled with white sand washes, and the Whitewater Creek from the San Bernardino Mountains enters the desert from the north at the mouth of the Pass, and the mountain vegetation, and to a slight extent the fauna

also, follows this stream to the desert." A short distance east of the Pass is Warren's Well, where a few specimens were procured. It is "in the Tree Yucca Belt, the upper edge of which is marked by scrub-oak, juniper, and piñon pines. A considerable number of specimens were captured in Morongo Pass, among which was a new species of *Onychomys* and topotypes of *Thomomys cabezonæ*. The next camp was made at Burn's Spring, in Burn's Cañon, on the east slope of the San Bernardino Range, at an altitude of 5,000 feet. This "is situated in the Upper Sonoran Zone amid the piñon pines, tree yuccas, junipers, and scrub-oaks. In this region the creosote bush is found at an altitude of 4,500 feet and carries the Sonoran Zone well up the cañon. Above the cañon are flats where cacti and yuccas abound, and the only Upper Sonoran plant found is the juniper. The new *Onychomys* was also taken at this place. A number of the desert species were found here, and *Citellus leucurus* and *Dipodomys m. simiolus* were common.

The Mohave Desert was now reached and the next stopping-place was Old Woman's Spring, "situated on the level sandy desert at an altitude of 3,200 feet, at the east base of the San Bernardino Mountains. The creosote bush is the predominant vegetation on the sandy areas, with various species of *Atriplex* in the dry lake beds. The tree yuccas straggle down to this locality, which is their lower limit. Cacti are rare at the spring." Passing through Victor on the Santa Fé Railroad, where one night was passed and a few specimens secured, the next camp was made at Oro Grande, about forty miles northwest of Old Woman's Spring, where a week was given to collecting. "Oro Grande is situated on the Mohave River at an altitude of 2,600 feet, where the river cuts through a nearly level mesa country of granite formation, which rises a few hundred feet above its bed. The Mohave sinks a little east of Oro Grande, but the water is usually permanent in its bed the year round at this point, and this marks the limit of the paludose plants and such species of mammals as have followed this vegetation down from the river's source. The vegetation of the neighboring hills and mesa is wholly desert in character, and consists of creosote bushes, *Atriplex*, yuccas, and a large variety of cacti, in which many of the desert animals find shelter. In the river valley are cottonwoods, willows, *Bacharis*, grasses, reeds, etc., and in the drier parts of the desert are willows (*Chilopsis*), screw-pod mesquites, sage-brush, etc. The plains and hills through which the river flows are all in the Lower Sonoran Zone, and the vegetation of the river valley is a part of that Zone." A considerable number of specimens were obtained during the sojourn

at this camp, and one new race of *Neotoma*, quite characteristic of the desert, and a new species of *Lepus*, were procured.

From Oro Grande, Mr. Heller next went to DAGGETT, "situated on the south bank of the Mohave River about fifty miles northeast of the last stopping-place, at an elevation of 2,000 feet above the sea. At this place the river is a dry sand wash with low banks which rise gradually to the level gravelly desert through which the bed has been cut. The river, at intervals of several years, contains water for a short period during the winter as far down as Daggett, and a narrow part of the bed is free from vegetation. The greater part of the bottom land is composed of fine white sand, which has been drifted into small sand dunes a few feet in height, which gives it an undulating surface. This part of the bed supports a growth of desert willows, *Chilopsis*, together with a few creosote bushes. The level and border parts of the bed are covered with a thick growth of *Atriplex* bushes. The country bordering the river valley consists of extensive plains of granite gravel, which slope gradually toward the river from the low granite hills of the more distant country. This is perhaps one of the most desolate parts of the Mohave Desert. The soil supports a widely scattered though even growth of straggly creosote bushes, interspersed with a few low *Atriplex* bushes; cacti and other vegetation is rare except in cañons." At this place there was a stay of ten days, and especial efforts were made to procure *Citellus mohavensis* and *Dipodomys deserti*, and fair series of both were obtained. Among the various animals taken was a new species of desert fox which ranges through this district north to the Panamint Mountains, and has its allies in British Columbia and west of the Sierras.

The next camp was at COPPER CITY, an abandoned mining camp thirty-five miles northwest of Daggett, at an elevation of 4,200 feet. "It lies at the south base of the Granite Mountains, of which Pilot Knob, seven miles north, is the eastern terminus, and on the north side of Paradise Valley. This last is an immense level, with a forest of giant yuccas, except in its central portion, where several dry lake beds occur. LANE'S MILL, where a few specimens were taken, is situated at the southeast border of the valley. The vegetation about COPPER CITY is almost wholly creosote, which grows luxuriantly at this elevation on the loose, gravelly soil. Beneath the creosote bushes a flourishing growth of annuals is found for a short time in the spring. The entire region is in the upper part of the Lower Sonoran Zone: The most abundant mammal of this district was *Perognathus panamintinus*, and it was found everywhere on the loose,

gravelly soil about creosote bushes; but no specimens of *Dipodomys m. simiolus* were seen, and the animal appeared to be entirely absent from the region.

From this place, proceeding northward, Mr. Heller's next camp was at Lone Willow Springs, in the Panamint Valley. This last "lies at an elevation of 1,200 feet between the Slate and Argus Mountains on the west and the Panamint Range on the east. It is a long, narrow valley extending north and south without outlet, its lowest part being occupied by an alkaline marsh, which is usually dry. The sides of the lake are in some places vertical walls, which show traces of wave action, and are occasionally made up of fossil mollusca, or more commonly show traces of cavities where such fossils existed. It is evident that the valley was very recently an inland sea or lake. The physical features are identical with those of Death Valley, of which it is a prototype at a somewhat higher elevation." Collections in this valley were made in two places, Lone Willow Springs and Ballarat, the first being at the southern end, in the Slate Range, at an altitude of 2,500 feet. "The country about the Spring is broken by numerous small washes and rock ledges, with the creosote most abundant on the hillsides, while the mesquite and cacti occur about the rocky places. Ballarat is on the eastern side of the valley and at the head of the alkali marsh. The Lower Sonoran Zone covers the valley and the hills to an altitude of 7,000 feet above the sea." A short stay only was made at these places and only a few mammals were taken. The soil in the valley is extremely dry, and in consequence of this no species of *Thomomys* is found there, although they occur in the cañons and on the summits of the mountains.

From Ballarat Mr. Heller passed through Emigrant Pass to Mesquite Valley, which is "in the northern end of Death Valley and slopes gradually to the south, but all of its surface is above sea level. Death Valley lies between the Panamint Range on the west and the Funeral and Grapevine Ranges on the east. It has a general northwest and southeast direction, attaining an extreme length of about 120 miles and a maximum width of fifteen miles. Death Valley proper comprises the southern third part, and consists almost wholly of an extensive alkaline or borax marsh, the whole of which is more than 100 feet below sea level. The lowest depressions in this marsh are 480 feet below sea level. Employing the lowest level as a base, we would have the Panamint Range reaching a height of over 11,000 feet and the Funeral Mountains of about 7,000 feet. The marsh is snowy white in appearance, being covered

by a deposit of various salts and alkalies, but the surface is broken into innumerable cavities and raised into pinnacles a foot or two high, which have hardened into unyielding masses. Farther out toward the middle the surface is more moist and less rough, but it is wholly without vegetation, except near the margin, where the composition is less alkaline. The level ground bordering the marsh is covered by a pure growth of salt-grass, which gives way nearer the marsh to a heavy growth of pickle weed, *Allenrolfea*, which forms a narrow border or setting to the snowy expanse. Away from the marsh in sandy soil and in creek beds the mesquite grows luxuriantly. Between the mesquite and the salt-grass near the marsh several species of *Atriplex* flourish. On the gravelly soil sloping down to the valley from the mountains the creosote bush predominates. FURNACE CREEK enters the marsh near its northern end from the Funeral Mountains, and is marked by a luxuriant growth of mesquites, willows, cottonwoods, *Baccharis*, *Pluchea*, tules, reeds, etc. The entire valley is covered by clumps of large mesquites and in moist places near its walls by patches of screw-pod mesquite, cane-fields, bunch-grass, willows, etc. The southern part of the valley has been blown into huge sand dunes forty or more feet in height. Over most of this area water can be found within two or three feet of the surface, but it is often intensely salt. The rarity of mammals in the valley was striking, and this can be attributed to the Panamint Indians, who trap all kinds of mice and rats for food. Their "dead falls" were seen about every clump of mesquites, and a single Indian, it is said, will catch daily seventy-five or more rats and mice for his family." An interesting collection was made in this valley and new forms were obtained in *Citellus*, *Dipodomys*, and *Lepus*, as well as topotypes of *Neotoma desertorum*.

From Death Valley Mr. Heller passed into the Panamint Mountains and made his first camp at WILD ROSE SPRING. Of this lofty range he writes as follows: "The Panamint Mountains proper extend from Windy Pass, at the southern extremity of Death Valley, to Emigrant Cañon, at the southern end of Mesquite Valley, a distance of about forty-five miles. North of Emigrant Pass, which has an altitude of 5,500 feet, the Range is continued as a broad mesa country, which in some places attains an altitude of more than 9,000 feet, and extends as far north as Mount Magruder, which gives the Range a total length of 115 miles. Telescope Peak, the summit of the Range, has an altitude of 10,938 feet and is situated nearly due west of the lowest portion of Death Valley. The Range at this point is very narrow, with very steep sides, making the area reaching above

8,000 feet so small that its limited fauna and flora do not show the characteristic forms belonging to such altitudes. The higher parts of the Range, in contrast to the usual eruptive formation of the desert ranges, is made up almost wholly of sedimentary rocks. The ridge and sides of Telescope Peak are composed of slate, which formation evidently accounts for much of its steepness. Lower down, the Range is made up largely of a hardened, metamorphosed sandstone of various colors, with its strata much contorted and folded. Various kinds of schists form a large part of the rock formation also. Lower down, some granite and much porphyry and basaltic lava form the slopes of the Range. The Panamints are evidently much younger than other desert ranges and have not been subject to erosion long enough to wear away the sedimentary rocks which overlie the igneous or eruptive series, except near their base.

The Panamint Range is flanked by the lowest and hottest deserts in America and is everywhere subject to extreme dryness. On account of these conditions the Lower Sonoran Zone extends far up the mountains, the creosote bush, its characteristic floral species, reaching an altitude of 5,000 feet. The lower edge of the Upper Sonoran Zone, which is marked by the Juniper Belt, extends down to 6,000 feet. Between these two belts a small shrub, *Colcogyne*, forms a nearly pure growth and covers large tracts at the north end of the Range between these altitudes. The piñon, *Pinus monophylla*, forms an extensive forest between the altitudes of 7,000 and 9,500 feet. Above the area of the piñon the white-barked pine, *Pinus flexilis*, predominates for a short distance and extends to the summit of Telescope Peak, where it becomes a prostrate shrub. From 9,000 feet to the summit of the highest peaks the bristle-cone pine, *Pinus aristata*, forms a heavy forest of tall columnar trees, in which *P. flexilis* is seldom seen. The last two species, in the absence of the yellow pine, evidently mark the Transition Zone, although the latter is closely related to the Boreal-timber-line tree of the Sierras. *Pinus flexilis*, however, is found commonly in the Yellow or Black Pine Belt of the Sierras, beyond which belt it does not extend far. Besides the pines and junipers, the following species were found in the Upper Sonoran and Transition Zones:

Populus tricocarpa.—Balsam cottonwood; a few seen in Hannopee Cañon, at 8,500 feet.

Salix.—Various species of willows occurred in the cañons to an altitude of 9,000 feet.

Cercocarpus.—Mountain mahogany was abundant about the Coal Kilns and ranged from 7,000 to 9,000 feet.

Acer glabrum.—A small maple occurred widely scattered along creek beds from 7,000 to 10,000 feet.

Sambucus.—The elderberry was observed occasionally between the altitudes of 7,500 and 9,000 feet.

Amelanchier.—The June-berry was seen only near the Coal Kilns, where it formed an extensive thicket about a spring, the bushes attaining a height of ten feet.

Spirea.—A few bushes seen at 8,500 feet on Hannopee Creek.

Symphoricarpus.—The snow-berry was an abundant bush from 7,000 feet to the summit of the range.

Artemisia tridentata.—The sage-brush formed a heavy growth in many places and occurred from 6,000 feet to the summit of the range.

Ceanothus.—A small Buck-thorn, or lilac, occurred sparingly at 8,500 to 10,000 feet.

In the lower part of the Upper Sonoran Zone, and lower, various species of cacti of the genera *Opuntia*, *Cereus*, and *Echinocactus* were abundant. The mesquites were common in creek beds up to an altitude of 6,000 feet."

Wild Rose Spring "is situated at the north end of the Range proper, on the western side, on a broad, open flat, at 4,500 feet. A small stream rises at the spring and flows a short way down the cañon. The spring and cañon are overgrown by rose bushes, willows, *Baccharis*, etc., and has long been the favorite residence of the Panamint Indians. The higher ground near the spring is comparatively level and of a sandy character, with loose rocks scattered through it. The vegetation near the spring is largely creosote, but this soon gives way to an unbroken growth of *Colcogyne*." A series of *Perognathus panamintinus* was obtained here, and I presume they are topotypes, as PEROGNATHUS FLAT, the type locality of the species, lies between Wild Rose Spring and Emigrant Cañon. This Spring appears to be near the northern boundary of *Vulpes arsipus*, being the most northern point at which the animal was taken. From Wild Rose Spring, the second ridge of the range was crossed and camp made in Hannopee Cañon (which extends directly east from Telescope Peak), at an elevation of about 7,500 feet, near the lower edge of the Piñon Belt, where seven days were passed, and a considerable number of specimens secured. "Hannopee Cañon," says Mr. Heller, "drains the whole of the east side of Telescope Peak and contains the largest stream of water in the Panamint Range. Our first camp was situated on the north fork, at about 8,500 feet, and another camp was made in the main cañon at about 6,000 feet, where a con-

siderable stream of water flows through the cañon. This locality was at the upper limit of the creosote and mesquite vegetation. Here a series of *Tamias panamintinus*, among other desirable specimens, were secured, and new forms of *Thomomys* and *Lepus* were taken. The route from here was retraced to the Coal Kilns, north of Telescope Peak, where four days were passed. This camp was "about ten miles southeast of Wild Rose Spring and much nearer the ridge of the Range, but in the same drainage. The 'Kilns' are in an open ravine, a short distance above the flat on which the Spring is situated. The ravine at this point is 7,500 feet in altitude and the hills lie at the lower edge of the Piñon Belt. A large number of mountain mahogany and juniper trees covers the floor of the ravine at this point." At this cañon a new species of *Peromyscus* was secured. From here the route was through Shepherd Cañon, in the Argus Mountains, and then over the Coso Mountains to Keeler and Lone Pine. The first camp was made in the cañon above named, and then two days were passed on the Coso Range, one at the south end, in the upper part of the *Yucca arborescens* Belt, and another at the north end, at about the same elevation, and forty or fifty mammals were secured, some very desirable. Mount Whitney and the neighboring region in the Sierra Nevada was the next objective point, and a considerable stay was made in the various localities. Of this region Mr. Heller writes as follows: "The greater part of the high meadows of the southern Sierras are in the Boreal Zone; that is, they are above the belt of black pines, *Pinus jefferi*. The Boreal is here made up largely of two trees, the lodge pole pine, *Pinus murrayana*, and the fox-tail pine, *Pinus balfouriana*. The former is confined to the borders of meadows and streams, and follows the water courses to timber-line, where it becomes dwarfed and prostrate. The fox-tail pine grows on the ridges and hillsides above the other species and forms a heavy growth at timber-line, where it grows erect, but somewhat dwarfed. Both trees have practically the same range, but each grows on a different kind of ground. These two pines formed the great bulk of the forest. A few black pines occur on the lower edge of the Boreal on Cottonwood Creek and about *Monache and Ramshaw Meadows. About Monache Meadow occur considerable forests of *Abies magnifica*, the red fir, and on the ridges are a few *P. lambertiana*, the sugar pine.

About Crater Meadow, on Whitney Creek, and at Ramshaw Meadow, the western juniper, *J. occidentalis*, was abundant on rocky

* Mr. Heller throughout his notes spells this, Monache; Dr. Merriam, on the other hand, gives it as Menache.

hillsides. The streams here were bordered by small willows and in some places by balsam cottonwoods, *P. tricocarpa*. In the lower part of the Boreal Zone considerable brush occurred. The commonest shrubs were manzanita, mountain mahogany, chincapin, sage-brush, snow-berry, currants, etc.

The lower part of Long Cañon is in the Transition Zone. At this point a considerable number of trees and shrubs reach their upper limits. Among these are the incense cedar, yellow pine, silver fir, sugar pine, piñon pine, white alder, cañon live-oak, California black oak, cascara buckthorn, *Garrya*, etc. The lodge-pole pine does not range below this altitude.

The rock formation of the higher parts of the Sierras is chiefly a light grayish granite, which splits up into hard, angular blocks. On the east side of Whitney Creek, near Ramshaw Meadows, are two large craters of red basaltic lava, which have poured out a large stream of lava and covered the country for several miles to the west and southwest and broken the granitic monotony. Much of the topography is rugged, as is usual in granite regions, especially at the lower elevations where streams have been able to do considerable sculpturing."

The first camp in this region was in Little Cottonwood Meadows, near the summit of the Range, at about 9,500 feet altitude, and the next at Big Cottonwood Meadows, where six days were passed, and then the camp was moved to Ramshaw Meadows, fifteen miles south, at an altitude of about 8,000 feet. Crater Meadows, on Whitney Creek, a few miles west of Ramshaw Meadows, was the next stopping-place, where Mr. Heller remained six days, and then went to Whitney Meadows, 9,000 feet elevation, and passed six days there. At all of these localities collections were made of interesting material, and at Crater Meadows the new form of *Gulo* and topotypes of *Microtus dutcheri* and *Thomomys alpinus* were obtained. Long Cañon was next visited, and a stay of four days made there, and the route was continued to Hot Springs, several miles lower down the Cañon, and then Monache Meadows was visited, at the southwest base of Olancha Peak, and the last camp was made at the head of Big Cottonwood Creek, at the lakes situated at timber line, at the east base of the peak of Old Mt. Whitney (Mt. Corcoran).

Valuable collections were made at these points, and but one new form, *Teonoma c. acræa*, at Hot Springs, was taken.

Mr. Heller now went into the Inyo Mountains and remained two weeks, the first camp being at a spring in Beveridge Cañon, on the east slope, at about 6,000 feet elevation. He says of this place

that the "geological formation and vegetation are almost identical with that found in the Panamint Range and many of the mammals are apparently the same species, here reaching their western limit." About forty specimens were taken at this place, and the camp was moved to the summit of the Range and water brought up from the spring, eight miles below, for their use. "At this elevation *Pinus flexilis*, the Rocky Mountain white-barked pine, and *Pinus aristata*, the bristle-cone pine, occurred." Leaving the mountains, Mr. Heller proceeded to Lone Pine, a settlement "situated at the base of the Sierras on the west side of Owens Valley, a few miles north of the lake. It is at an altitude of 3,800 feet, on a natural dry swale, at the mouth of Lone Pine Creek. The place is separated from the slopes of the Sierra by a low range of bare granite hills. The fauna and flora have few desert characteristics, most of these having been derived from the Sierra Nevada Range. The vegetation on this side of Owens Valley consists largely of sage-brush (*Artemisia tridentata*), *Atriplex*, and various shrubby compositæ. The paludose vegetation of the streams consists of willows, the western birch, cottonwoods, ash, roses, etc. Near the streams thickets of *Ceanothus* and *Rhamnus* occur. The region is in the Upper Sonoran Zone. The streams do not extend much beyond the base of the Range, being soon lost in the sandy valley. As they depend on the melting snow, they are largest during mid-summer. The Piñon Zone of the Sierras extends down to about 7,500 feet, which does not carry it even to the base of the Range."

A good number of mammals was procured at this place, among which were two new forms of *Peromyscus*, and topotypes of *Neotoma f. dispar*, *Microtus c. vallicola*, and *Thomomys a. perpes*.

From here Mr. Heller went to Keeler, "on the east shore of Owen's Lake, at an altitude of 3,622 feet. For a half-mile or more before the lake is reached is a level expanse of white, sandy soil, containing a large amount of soda and other salts, which have been deposited as the waters receded. To this sandy margin and alkali soil several species of mammals are confined and owe their coloring, apparently, to the composition of the soil. Just back of the water's edge is a considerable expanse of bare mud and deposit of soda, etc., and beyond this occurs a growth of salt-grass about a hundred yards wide, succeeded by tracts of loose sand, with a scattered growth of *Atriplex* bushes, which gradually give way to small sand dunes and creosote bushes." The mammals from this place have their coloration intensified, and even such species as are found in other localities have a much richer pelage exhibited by individuals from Keeler.

New forms of *Citellus*, *Dipodomys*, and *Perognathus* were procured here, and also topotypes of *Thomomys operarius* and *Dipodomys m. nitratus*. From this last stopping-place Mr. Heller drove to FORT TEJON, which journey occupied nine days, and a week was passed at this place. Mr. Heller writes: "Fort Tejon lies in the San Joaquin drainage, a few hundred feet below the divide between the Mohave Desert and the San Joaquin Valley. North of the Fort the Tehachapi Range rises gradually northward and culminates in Tehachapi Peak. At their southern end near the Fort, their sides are gently rounded and the summits broad and level. To the south of the Fort, Mt. Pinos rises abruptly to a height of nearly 10,000 feet. On this mountain three new forms belonging to the genera *Peromyscus*, *Neotoma* and *Perognathus* were procured. Three drainage systems center about Mt. Pinos; those of the north and west slope into the San Joaquin Valley; those of the east and south go toward the coast, and that of the east of the slopes of the Tehachapi and Libra Ranges, passes into the Mohave Desert. The west, or rather northwest, slope of the pass drops away much more rapidly than the east, which drops about 500 feet in ten miles, where it merges into Antelope Valley.

The rock formation is largely shale, sandstone, or limestone. The hills down to an altitude of 2,000 feet are heavily covered with chaparral of scrub-oak, buck-thorn, chamiso, manzanita, *Garrya*, and other shrubs. In the cañons and ravines several kinds of oaks predominate. The hills above 4,000 feet are covered by a scattered forest of piñon pines, which give way to the black pine at 6,000 feet. The desert slope of the hills is similar in vegetation to that of the coast, but supports a scattered growth of gray pines below the Piñon Zone. The lower slopes of hills bordering the San Joaquin Valley are largely clothed by buckeyes, poison-oak, box-elder, cottonwoods, willows, and *Isomeris* brush. The valleys among the hills are usually open and grassy below 5,000 feet, with a widely scattered growth of California white oak. Above 5,000 feet many of the valleys are choked with sage-brush and scrub-oaks.

Three days were passed at the mouth of the CAÑADA DE LAS UVAS, between the Fort and Rose Station, on the edge of the San Joaquin Valley, and topotypes of *Antrozous p. pacificus* were procured. Five days were passed at CASTAC LAKE, and then LOCKWOOD VALLEY was visited. This Valley lies "broad and open at the east base of Mt. Pinos, at an elevation of 5,000 feet. The drainage is southeast into Piru Creek. The valley is chiefly a sage-brush plain, and the hills surrounding it are forested with *Pinus mono-*

phylla and scrub-oaks. Here a small series of a new form of *Perognathus* was taken. Three days were passed at Bailey's Ranch, at the headwaters of Piru Creek, about twenty miles from its mouth, which is near the type locality of *Euderma maculata*, but nothing resembling this species was seen. "The ranchers had never seen any bat answering the coloration of *Euderma*, but had killed *Antrozous*, *Vespertilio*, and *Pipistrellus*." From here Mr. Heller went to Neenach, Antelope Valley, where was a small herd of antelope that were protected. He had a permit to take a male and female, and with the acquisition of these, his journey was brought to a close.

ORDER UNGULATA.

FAM. CERVIDÆ.

*ODONTOCŒLUS.

Odontocœlus hemionus.

Cervus hemionus Rafin., Amer. Month. Mag., 1, 1817, p. 436. Elliot, Syn. N. Am. Mamm., 1901, p. 42.

2 Specimens ♂ ♀ : Long Cañon, Mt. Whitney.

"Deer were secured only at the head of Long Cañon, near Mt. Whitney, at 8,500 feet elevation. In this part of the Sierras their tracks were not rare on brushy hillsides and rocky ridges. The species in this region is subject to vertical seasonal migrations. The winter months are spent on the lower slopes of the range along both the eastern and western sides, until the early summer, when a gradual upward migration takes place until midsummer to the upper limits of the manzanita and *Ceanothus* brush, at about 9,500 feet altitude. This marks their extreme upper limits, the majority being found 1,000 or 2,000 feet lower where the brush is heavier. Their tracks are seldom seen in open pine forests or in meadows. Deer seldom occur on the Inyo Mountains, except occasionally in winter as strays from the Sierras. No deer occur on the ranges east of the Inyo Mountains. Their absence in the high pine-clad Panamint Range is no doubt due to the lack of brushy areas. In the hills about Fort Tejon, in the Tehachapi and Mt. Pinos Ranges, deer tracks were abundant in the heavy oak and *Ceanothus* chaparral. In the foothills of the San Jacinto Range near Palm Springs and

*If it is necessary to burden our nomenclature with Rafinesque's generic term, founded upon a tooth of some undeterminable animal, let us at all events spell it correctly, *οδούς*, tooth, *κοῖλος*, hollowed—Odontocœlus.

in the lower slopes of the San Bernardino Range near Morongo Pass and Burn's Cañon, they are said to occur sparingly. Formerly they descended the valley of the Mohave River as low as Oro Grande."

FAM. ANTILOCAPRIDÆ.

ANTILOCAPRA.

Antilocapra americana.

Antilocapra americana Ord, Guth., Geog., 2d Amer. ed., II, p. 292. Elliot, Syn. N. Amer. Mamm., 1901, p. 43.

2 Specimens ♂ ♀: Antelope Valley, near eastern base of the Tehachapi Mountains.

A herd of thirty was found in the western end of Antelope Valley, near the eastern base of the Tehachapi Mountains, on the western border of the Mohave Desert. This band is the remnant of the hundreds that recently inhabited this arm of the desert. The central sandy portion of the valley is covered by a heavy forest of tree-yuccas, which is flanked by an open adobe plain supporting a scanty growth of bunch-grass and alfilerea, to the bases of the bordering hills and mountains. Upon this open plain the antelope are always to be found in a compact herd. Occasionally they go to the mouths of the cañons for water, or wander out into the edge of the yucca forest. As they are now protected by law, they have become quite tame and would increase rapidly, were it not for the destruction of the young by coyotes, which harass the band constantly. While stalking this herd several coyotes were observed following the antelope and a few of the old bucks were seen pursuing one, attempting to disable it by striking it with the fore feet. A fawn seen in captivity at one of the ranches had been rescued from the attacks of two coyotes that had cut it out from the main herd and had almost succeeded in running it down. Formerly when antelope were abundant, they retired to the small, sheltered valleys among the foothills to winter, and in the spring brought forth their young in such retreats; but the existing herd, on account of its small numbers and the settled condition of the country, is strictly resident on the open plains. Much of the country they now inhabit is a cattle ranch fenced by barbed wire, but such barriers do not confine their movements. In passing such obstacles they slip gracefully between the wires. The young, which are normally two in number, are dropped early in the spring. The rutting season is evidently in mid-

summer, as the horns are shed in the early part of October or late in September. A male shot the middle of October had small, soft horns, and a female taken the same date had shed one horn, but still retained the other. This specimen contained two embryos about three months old.

At the head of the San Joaquin Valley, near the western termination of Tehachapi Pass, a herd of seven antelope is said to be still in existence on the open plains of the valley. Another band of about the same proportions was reported still farther west, near Buena Vista Lake, and another one on the Carriso Plains, on the western side of the San Joaquin Valley. They are said to have formerly migrated through the low passes in the Tehachapi Mountains from the San Joaquin to the Mohave Desert.

ORDER RODENTIA.

FAM. SCIURIDÆ.

SCIURUS.

A. Hesperosciurus.

Sciurus griseus.

Sciurus griseus Ord, Guth., Geog., 1815, p. 292. Elliot, Syn. N. Am. Mamm., 1901, p. 55.

1 Specimen: Hot Springs, Mt. Whitney.

"This squirrel was not common at this elevation, where they were confined to the black pine timber, *Pinus jeffreyi*, which does not extend much above this altitude. They were also seen about Fort Tejon and on Mt. Pinos. About the fort they were found in the white and live-oaks, and on Mt. Pinos in forests of *Pinus jeffreyi*.

Sciurus douglasi albolimbatus.

Sciurus d. albolimbatus Allen, Bull. Am. Mus. Nat. Hist., 1898, p. 453. Elliot, Syn. N. Am. Mamm., 1901, p. 66.

11 Examples: 1 Whitney Creek, 1 Whitney Meadows, 4 Ramshaw Meadows, 4 Big Cottonwood Meadows, 1 Hot Springs, Long Cañon, Mt. Whitney.

"An abundant species in the Canadian Zone of the high Sierras, in the vicinity of Mt. Whitney. Most of the chicarees were seen in forests of lodge-pole pines, *Pinus murrayana*, but they were not rare in growths of the fox-tail pine, *Pinus balfouriana*. None were seen below the range of the lodge-pole pine or below 8,000 feet. At timber-line they were rare, the favorite

altitudes of the species being from 9,000 to 10,000 feet. At the Hot Springs their range overlaps that of the gray squirrel, but the two species inhabit different kinds of timber."

TAMIAS.

Tamias merriami.

Tamias asiaticus merriami Allen, Bull. Am. Mus. Nat. Hist., 1889, p. 176.

Tamias merriami Elliot, Syn. N. Am. Mamm., 1901, p. 71.

13 specimens from Lockwood Valley, Mt. Pinos. Altitude, 5,000 feet.

"This species was found abundantly about Mt. Pinos at from 5,000 to 6,000 feet in the scrub-oak and piñon timber. At the time of our visit, early in October, the chipmunks were busy gathering the nuts of the piñon, *Pinus monophylla*, and the ground at the bases of the trees was covered with heaps of cone scales, from which radiated the trails of the chipmunks in every direction. About Fort Tejon, which is below the Piñon Belt, these animals were more scarce and confined to thickets of scrub-oaks, *Quercus chrysolepis* and *Q. dumora*. Several were found living in deserted nests of *Neotoma f. streatori*."

This was the only chipmunk seen upon Mt. Pinos, no individuals of *Tamias callipeplus* having been observed.

Tamias callipeplus inyoensis.

Tamias c. inyoensis Merr., Proc. Biol. Soc. Wash., 1897, p. 208; Elliot, Syn. N. Am. Mamm., 1901, p. 73.

Two examples were procured at the summit of the Inyo Range, at an elevation of 8,500 feet.

"In this region the species was found largely on the bristle-cone pine, *Pinus aristata*, occasionally straying to the upper limits of the limber pine, *Pinus flexilis*, and the summit of the range east of Lone Pine marks the southern limits of the two pines which this chipmunk inhabits, and consequently at this point but few were seen."

Tamias frater.

Tamias frater Allen, Bull. Am. Mus. Nat. Hist., 1890, p. 88; Elliot, Syn. N. Am. Mamm., 1901, p. 73.

22 Specimens from Mt. Whitney, 6 Monache Meadows, 1 Hot Springs, 2 Big Cottonwood Lakes, 7 Big Cottonwood Meadows, 6 Whitney Creek.

"About the high meadows near Mt. Whitney this was one of the most abundant mammals. Above 10,000 feet it becomes rare, and is seldom seen near timber-line. Near Big Cottonwood Creek it was common on bushy hillsides, about manzanita and mountain mahogany chaparral. Few were seen below 8,000 feet, they being apparently most numerous above the belt of black pine.

Tamias panamintinus.

Tamias panamintinus Merr., Proc. Biol. Soc. Wash., 1893, p. 134. Elliot, Syn. N. Am. Mamm., 1901, p. 74.

57 Examples: 17 Hannopee Cañon, 17 Coal Kilns, 9 Beveridge Cañon, 13 summit of the range east of Lone Pine, Panamint Mountains.

"In the Panamints this chipmunk was fairly common from the lower edge of the Juniper Belt, or 7,000 feet elevation, to the summit of the range. During May and June, when our observations were made the species was feeding on the seeds of the juniper, most of those secured having their cheek pouches filled with the nuts. It was also abundant on the Inyo Mountains from 6,000 to 9,000 feet altitude. It descends about 1,000 feet below the Piñon Belt, following the brush along streams. In the drier part of the range it came to the springs daily about noon, coming down the cañon sides slowly and cautiously, and stopping often to utter its sharp, chattering alarm notes. Above the Juniper Belt they were found commonly in the limber and bristle-cone pines."

Tamias minimus alpinus.

Tamias m. alpinus Merr., Proc. Biol. Soc. Wash., 1893, p. 137. Elliot, Syn. N. Am. Mamm., 1901, p. 79.

26 Specimens: 12 Big Cottonwood Meadows, 1 Little Cottonwood Meadows, 5 Whitney Meadows, 6 Whitney Creek, 2 Mt. Corcoran.

"In the elevated valleys near Mt. Whitney this was the most abundant chipmunk. It is especially common at timber-line, where it lives amid the gray granite boulders, to which its pale coloration is well suited. Wherever found it usually occurs among rocks rather than about logs and timber. The species was seldom seen below 9,000 feet. A few were seen as far south as Olancha Peak, which marks the southern extremity of timber-line peaks and also the range of the species."

CITELLUS.

Citellus chrysodeirus.

Citellus chrysodeirus Merr., N. Am. Faun., No. 4, 1890, p. 19. Elliot, Syn. N. Am. Mamm., 1901, p. 84.

26 Examples: 3 Little Cottonwood Meadows; 11 Big Cottonwood Meadows, 3 Whitney Meadows, 1 Whitney Creek, 4 Monache Meadows, 1 Ramshaw Meadows, 2 Big Cottonwood Lakes, Mount Whitney, 1 Summit of the Inyo Range east of Lone Pine.

"An abundant species in the Boreal Zone of the Sierras in the Mount Whitney region. It is not common in the Transition Zone, the upper part of which it invades as low as 8,000 feet, or the lower limit of the lodge-pole pine. Between 8,000 and 10,000 feet it is most abundant, extending its range to timberline, but never becomes common at such high altitudes. The lodge-pole pine forests bordering meadows and streams are its favorite haunts, the burrows being usually placed among granite boulders. A few individuals were found on the summit of the Inyo Range at 8,500 feet in forests of limber pine. Their distribution on this range corresponds with that of *Tamias c. inyoensis*."

Citellus leucurus.

Citellus leucurus Merr., N. Am. Faun., No. 2, 1889, p. 20. Elliot, Syn. N. Am. Mamm., 1901, p. 86.

32 Specimens: 10 Palm Springs, 9 Whitewater, 1 Banning, 4 Morongo Pass, 3 Lone Willow Spring, 5 Daggett.

"In the eastern part of San Gorgonio Pass the antelope squirrel occurs abundantly on rocky mesas and on the gravelly bed of the pass. It extends westward through the pass as far as Banning, which lies a little below the summit on the western slope. The cheek pouches of the majority of the specimens secured contained the seeds of the cholla cactus, *Opuntia echinocarpa*, which is an abundant plant on the eastern slope of the pass. About Banning, however, the squirrels live in thickets of the coast chollas, *O. bernardina*, which is an abundant species from the summit westward to the San Bernardino Valley. Evidently the distribution of this *Citellus* is limited by the climatic influences of the coast slope, as the species extends over the summit of the pass, and its chief food supply extends much farther west.

About Palm Springs the species is confined to the rocky mesas bordering the desert, the mouths of cañons and the lower slopes of the mountains. It is not a species of the low, open,

sandy desert, but requires rocky or at least gravelly localities, except the higher brush-covered sandy areas of mesas.

The species was found as high as 6,000 feet on the eastern slope of the San Bernardino Range, which altitude was also attained by the desert cholla. It is a characteristic species of the Sonoran Zone, extending through both the lower and upper divisions, but of local distribution in the extreme upper and lower part of the zone.

Citellus leucurus vinnulus.

Citellus l. vinnulus Elliot, Pub. Field Columb. Mus., III, 1903, p. 240. Zoölogy.

19 Examples: 3 Summit of the Inyo Range east of Lone Pine; 4 Beveridge Cañon, 4 Keeler, 2 Coso Mountains, 2 Wild Rose Spring, 1 Hannopee Cañon, 3 Coal Kilns, Panamint Mountains.

Although Mr. Heller in his notes states that this spermophile is found in Death Valley, no specimens were taken there. He writes concerning this new form that it is "an abundant species on the higher parts of the Mohave Desert. About the mesquite thickets and sand-dunes of the northern part of Death Valley it was of rather rare occurrence, but on the mountains confining the valley it is much more abundant. This form ranges over the slopes of the Panamint Mountains to an altitude of 8,500 feet, or the upper limit of the piñon pines. They were especially numerous at 7,500 feet about the Coal Kilns, and at 8,000 feet on Hannopee Creek. In these high altitudes they are usually associated with thickets of Canutilla, *Ephedra viridis*, beneath which their burrows are usually placed.

The highest altitude attained by this species in the region traversed was in the Inyo Mountains, where they were secured at 9,000 feet, some distance above the Piñon Pine Belt. They were fairly common in this locality in the lower edge of the limber pine timber. The cheek pouches of the specimens secured at these altitudes contained seeds of mountain mahogany and of a small cactus, *Opuntia rutila*.

In Owens Valley, at the base of the range, they were less common, but generally distributed to the base of the Sierras, where they evidently do not ascend the slope much beyond 6,000 feet. About Keeler, on the shore of Owens Lake, they were abundant in the sand dunes and creosote vegetation."

Citellus nelsoni.

Citellus nelsoni Merr., Proc. Biol. Soc. Wash., 1893, p. 129. Elliot, Syn. N. Am. Mamm., 1901, p. 87.

5 Specimens from Rose Station, Fort Tejon.

This species inhabits the open, level, grassy plain of the San Joaquin Valley. A considerable number was seen near the head of the valley in grain-fields, about five miles beyond the northern base of the Tehachapi Mountains. In this locality they were found inhabiting burrows dug in the hard adobe floor of the valley, and were to be seen out only early or late, being considerable less diurnal than *C. leucurus*. On account of the open character of the plain inhabited by this squirrel, it is much more protectively colored, the white dorsal stripes and the white of the under side of the tail being scarcely conspicuous on the pale yellowish background of the body. They were not found anywhere closer than four miles to the foothills surrounding the valley, and it is probable that they do not leave the open valley.

Citellus variegatus fisheri.

Citellus v. fisheri Merr., Proc. Biol. Soc. Wash., 1893, p. 133. Elliot, Syn. N. Am. Mamm., 1901, p. 88.

12 Specimens: 1 Oro Grande, 2 Hot Springs, Mt. Whitney; 3 Lone Pine, 6 Fort Tejon, at the mouth of Cañada de las Uvas.

"This rock-squirrel was found on both slopes of the Sierras, as high as 8,000 feet, or the upper limit of the black pine, down to the floor of the Owens Valley and as far east as the Coso Valley. In the Colorado Desert it was seen on the eastern flank of the San Jacinto Mountains, and farther north in the Mohave Desert on the eastern slope of the San Bernardino Mountains. About Fort Tejon and the head of the San Joaquin Valley they were abundant in the white-oaks, and on the mountains as high as 6,000 feet, but do not extend farther east than the base of the foothills."

There is a considerable variation in the color of Mr. Heller's specimens, some being nearly black between the shoulders, like *S. v. douglasi*. These are from Oro Grande and Fort Tejon. Again, one from Lone Pine is of such a pale gray that if the others from the same locality agreed with it in color, there would be little hesitation in regarding it as entitled to subspecific rank, but the other examples are an unusually deep rich brown, which proves that the gray specimen exhibits merely an individual variation.

Citellus tereticaudus mohavensis.

Citellus mohavensis Merr., N. Am. Faun., No. 2, 1889, p. 15. Elliot, Syn. N. Am. Mamm., 1901, p. 98.

34 Specimens from Daggett.

"Near the dry bed of the Mohave River, near Daggett, this race was found in abundance. The burrows are usually placed beneath clumps of desert willows, *Chilopsis linearis*, in the white sand. The desert squirrel is very wary, and so protectively colored that it is seldom seen. The species is confined to creek washes and sandy lake beds in the lower part of the desert. Its note consists of a low, mellow whistle, uttered at long intervals."

In color it is practically impossible to distinguish this form from *C. tereticaudus*, and the only differences that appear to exist is that *mohavensis* has a shorter tail as a rule. Not deeming this a sufficient character by itself to constitute a species, it seems best to regard the form as only entitled to rank as a subspecies.

Citellus chlorus.

Citellus chlorus Elliot, Pub. Field Columb. Mus., III, 1903, p. 242. Zoölogy.

8 Examples from Palm Springs.

"Near Palm Springs this species was confined to the level, sandy desert, the burrows being placed beneath thorny bushes, usually mesquite. The characteristic whistling notes of this group were not heard during our visit in February, which may be due to their utterance during the breeding season only."

Citellus erenomonus.

Citellus erenomonus Elliot, Pub. Field Columb. Mus., III, 1903, p. 243. Zoölogy.

3 Specimens from Furnace Creek, Death Valley.

"This is not an abundant species in Death Valley. The Indians catch them for food in dead-fall traps, and their shyness and scarcity is apparently due to constant persecutions of this character. At the mouth of Furnace Creek the species was found in mesquite thickets, but farther north in Mesquite Valley no evidences of them were found."

MARMOTTA.

Marmotta flaviventer.

Arctomys flaviventer Aud. & Bach., Proc. Acad. Nat. Scien. Phila., 1841, p. 99. Elliot, Syn. N. Am. Mamm., 1901, p. 106.

13 Specimens: 7 Ramshaw Meadows, 6 Big Cottonwood Meadows, Mount Whitney.

In the high Sierras, near Mount Whitney, this marmot was abundant in the Boreal Zone from the upper edge of the Transition to timber-line. Their burrows are usually placed in loose piles of boulders of such gigantic size that no bear or other enemy can roll them aside or displace them. These retreats are close to meadows where vegetation is abundant and where only a short retreat is necessary to regain their burrows. The feeding is usually done in the heat of the day, but the meadow is not entered until a careful inspection of the vicinity has been made from the highest rock pile near the burrow. The animals usually live in colonies, and a few remain on guard while the others feed in the adjacent meadows. When danger is discovered a sharp whistle is given, which is answered by all the other sentinels and the feeders in the meadow, as soon as they discover the source of the danger move in a waddle as rapidly as possible toward the rocks for safety. Out in the meadow, accessory burrows are dug which are used as temporary retreats if the danger is such that they have not time to reach the home burrow. After the marmots have appeased their hunger they usually retire to the pinnacle of some rock pile and bask in the sun.

In the Mount Whitney region they usually begin to hibernate late in October, and appear again in the latter part of May, but their hibernation is regulated largely by the altitude they inhabit."

FAM. MURIDÆ.

MUS.

Mus musculus.

Mus musculus Linn., Syst. Nat., x ed., 1758, 1, p. 62. Elliot, Syn. N. Am. Mamm., 1901, p. 108.

2 Specimens: 1 Daggett, 1 Lone Pine.

ONYCHOMYS.

Onychomys pulcher.

Onychomys pulcher Elliot, Pub. Field Columb. Mus., III, 1903, p. 243. Zoölogy.

13 Specimens: 6 Morongo Pass, 1 Burns Cañon, 1 Warren's Well, 1 Daggett, 1 Lane's Mill, 2 Coso Mountains, 1 Lone Pine.

"On soil composed of coarse sand derived from decomposed granite seems to be the favorite situations for this genus. This

species in Morongo Valley was found on the sides of cañons in granite sand, but on the Mohave Desert they frequented level plains or valleys amid tree yuccas or about the dry washes of stream beds."

Peromyscus leucopus deserticola.

Peromyscus l. deserticola Mearns, Bull. Am. Mus. Nat. Hist., 1890, p. 285. Elliot, Syn. N. Am. Mamm., 1901, p. 125.

112 Examples: 5 Palm Springs, 2 Whitewater, 12 Morongo Pass, 3 Banning, 2 Warren's Well, 1 Burns Cañon, 1 Victor, 7 Oro Grande, 7 Coal Kilns, 17 Hannopee Cañon, 1 Wild Rose Springs, Panamint Mountains, 13 Hot Springs, 3 Monache Meadows, 1 Whitney Meadows, 1 Whitney Creek, 8 Big Cottonwood Meadows, 2 Coso Mountains, 14 Inyo Mountains, 12 Lone Pine.

"An abundant race from the lowest part of the desert to the highest parts of the Sierras where it was secured at timberline. On the desert this race occurs usually only about streams and wet meadows."

I refer all the specimens in this series to the present subspecies after critical examination and comparison with topotypes. It appears to range as widely as does its darker relative, *P. thurberi*, in Lower California, Mexico, and in the extreme southern part of California, affecting the hot deserts and cold mountain summits, apparently indifferent to temperature, bearing its extremes equally well. Some old individuals have an entire rich ochraceous pelage, very conspicuous among the paler specimens, but these are not confined to one locality, but come from the desert at Palm Springs, on the Morongo Pass at Banning, and in the high mountains at Hot Springs in the Panamints, and this dress cannot be considered seasonal, for some were taken in February, others in July, and therefore probably it is due to age. As is natural in a series as large as this there is considerable variation in the coloring of the specimens, and some approach in appearance to *P. t. gambeli*, but none is as dark as that mouse. It is a pale, widely dispersed, somewhat variable form, but possessing characteristics that cause it to be fairly recognizable at almost all ages.

Peromyscus parasiticus.

Peromyscus parasiticus Elliot, Pub. Field Columb. Mus., III, 1903, p. 244. Zoölogy.

6 Examples from Lone Pine.

"At the base of the Sierras, near Lone Pine, this form was secured about brushy areas bordering streams, and usually occupying deserted nests of *Neotoma fuscipes dispar*."

Peromyscus eremicus.

Peromyscus eremicus Baird, N. Am. Mamm., 1857, p. 479. Elliot, Syn. N. Am. Mamm., 1901, p. 136.

72 Specimens: 16 Palm Springs, 8 Whitewater, 11 Morongo Pass, 2 Warren's Well, 2 Burns Cañon, 2 Oro Grande, 1 Daggett, 5 Furnace Creek, Death Valley, 4 Fort Tejon, 4 Bailey's Ranch, 9 Cañada de las Uvas, 4 Neenach, 4 Mt. Pinos.

In the low, sandy parts of the desert this mouse occurs abundantly, ranging to an altitude of 5,000 feet, or slightly higher in suitable localities. The distribution of the creosote bush coincides fairly well with the distribution of this mouse." The five Death Valley examples are included with the others of this species with some hesitation, as their tails are much shorter, 99, 103.

Peromyscus petræus.

Peromyscus petræus (misprinted petraius.) Elliot, Pub. Field Columb. Mus., III, 1903, p. 244. Zoölogy.

68 Examples: 7 Palm Springs, 2 Morongo Pass, 4 Victor, 11 Oro Grande, 1 Daggett, 5 Copper City, 7 Lone Willow Spring, 6 Wild Rose Spring, 5 Hannopee Cañon, 1 Emigrant Spring, 1 Coal Kilns, 2 Coso Mountains, 9 Inyo Mountains, 7 Lone Pine.

"An abundant animal on the higher parts of the desert and on the flanks of the mountains in the same region. The species usually occurs on rocky mesas and hillsides, or in boulder-strewn creek beds, seldom on open, sandy flats. On the Panamint Mountains they were found from 5,000 to 9,000 feet, usually in areas covered by sage-brush, *Artemesia tridentata*. In the Inyo Range they were not found above 6,000 feet. On the east slope of the Sierras in Owens Valley and on the Coso Mountains they were common in sage-brush thickets."

Peromyscus montipinoris.

Peromyscus montipinoris Elliot, Pub. Field Columb. Mus., III, 1904, p. 264.

3 Specimens: 1 Lockwood Valley, Mt. Pinos, 2 Fort Tejon.

"A rather rare species in the mountains."

Peromyscus lasius.

Peromyscus lasius Elliot, Pub. Field Columb. Mus., III, 1904, p. 265.

32 Specimens: 17 Hannopee Cañon, 3 Coal Kilns, Panamint Mountains, 12 summit of the Inyo Mountains east of Lone Pine.

"This species was first secured in the Panamint Mountains, where it occurred from 6,000 to 10,000 feet, practically the Coniferous Belt of the range. The seeds of the juniper formed a large proportion of its food. In the willow growths about springs it was especially common. On the Inyo Range it was found on the summit down to about 8,000 feet, or the lower limit of the limber pines."

RHITHRODONTOMYS.

Rhithrodontomys megalotis.

Rhithrodontomys megalotis Baird, N. Am. Mamm., 1857, p. 451. Elliot, Syn. N. Am. Mamm., 1901, p. 151.

17 Specimens: 12 Lone Pine, 3 Fort Tejon, 1 Bailey's Ranch, 1 Mt. Pinos.

"This Harvest Mouse was abundant in Owens River and the creeks along the east slope of the Sierras. Also the meadows and creek banks near Fort Tejon and the headwaters of Piru Creek supported numbers of this species." It also was found in Lockwood Valley on Mount Pinos.

Rhithrodontomys longicaudus pallidus.

Rhithrodontomys l. pallidus Rhoads, Am. Nat., 1893, p. 835.

9 Specimens from Oro Grande.

"The grassy meadows bordering the Mohave River near Oro Grande were favorite places for this Harvest Mouse."

NEOTOMA.

Neotoma fuscipes macrotis.

Neotoma f. macrotis Thomas, Ann. Mag. Nat. Hist., 6th Ser., XII, 1893, p. 234. Elliot, Syn. N. Am. Mamm., 1903, p. 234.

1 Specimen from Whitewater.

Of this example Mr. Heller states it was secured from a nest in a clump of yuccas, and was apparently a stray individual from the San Bernardino Mountains. It is an old female with quite red pelage.

Neotoma fuscipes mohavensis.

Neotoma f. mohavensis Elliot, Pub. Field Columb. Mus., III, 1903, p. 246. Zoölogy.

7 Specimens from Oro Grande.

This new form of wood rat was procured at only one locality, "in the thickets bordering the Mohave River at Oro Grande," where were also found the large nests. The river sinks in summer beyond this point and the willows and rat nests cease a few miles lower down the stream. At the headwaters of the Mohave in the San Bernardino Mountains this race meets *N. f. macrotis* of the Coast Slope.

Neotoma fuscipes dispar.

Neotoma f. dispar Merr., Proc. Biol. Soc. Wash., 1894, p. 124. Elliot, Syn. N. Am. Mamm., 1901, p. 160.

11 Specimens: 10 Lone Pine (topotypes), 1 Mount Whitney.

This race was apparently scarce, for it was met with in only the two places named above, and the individual from Mount Whitney was a young one only about half grown, agreeing completely, however, with one of about the same age from Lone Pine. Mr. Heller states that "along the streams of the east slope of the Sierras and at Lone Pine the nests of this wood rat were not common. Their usual situation was in thickets of wild roses or willows near streams. The animal probably ascends the streams to the Transition Zone. None were observed below Lone Pine in the bed of Owens River."

Neotoma fuscipes cnemophila.

Neotoma f. cnemophila Elliot, Pub. Field Columb. Mus., III, 1904, p. 267.

8 Specimens: 5 Lockwood Valley, Mount Pinos (type and topotypes), 1 Castac Lake, 1 Bailey's Ranch, 1 Fort Tejon.

"In the mountains near Fort Tejon this wood rat was abundant. The nests were usually of large proportions, and constructed in oak chaparral or in the thorny thickets of *Ribes*. About Lockwood Valley on the south slope of Mt. Piños the nests were placed at the bases of the piñon pines, the nuts of which form an important food supply for the rats. A few immature were secured at 8,000 feet altitude on Kern River (but not preserved), and this evidently represents the upper limit of their range."

Neotoma desertorum.

Neotoma desertorum Merr., Proc. Biol. Soc. Wash., 1894, p. 125. Elliot, Syn. N. Am. Mamm., 1901, pp. 161, 429.

39 Specimens: 3 Copper City, 5 Lone Willow Spring, 9 Furnace Creek, Death Valley (topotypes), 6 Hannopee Cañon, 3 Coal Kilns, Panamint Mountains; 2 Coso Mountains, 5 Beveridge Cañon, and 3 at summit of Inyo Mountains east of Lone Pine, 3 Lone Pine.

In the Synopsis, page 429, I mentioned the statement of Mr. Bangs that Mr. G. S. Miller, Jr., had *examined* the type of *N. lepida* Thomas, and was of the opinion that that species and *desertorum* were the same. If Mr. Miller had *compared* specimens of *desertorum* and *lepida*, it would have been more satisfactory, for it is very difficult to carry in one's mind the appearance of a *Neotoma*, or indeed that of any animal not particularly conspicuous, sufficiently well to determine its identity; and as Mr. Miller merely states it is his opinion, it would seem wise before making *desertorum* a synonym of *lepida*, to wait until the two can be brought together. A description alone is a very unsatisfactory medium upon which to decide the status of these wood rats, and Mr. Thomas's measurements of his species proves that it is a smaller animal than *desertorum*, although an average of several specimens might show there is not much difference in size between them. Mr. Thomas's description is perplexing also in certain points, as when he says the tail is "thickly haired," causing a doubt as to whether it is a *Neotoma* or *Teonoma*. While *desertorum* has a hairy tail, there is no doubt it belongs to *Neotoma*. Under the circumstances, therefore, it seems best, for the present at least, to retain the name given by Dr. Merriam to the species. Mr. Heller states that this "is an abundant species on the desert, ranging from the lowest valleys to the summits of the highest desert ranges. On the Panamint Mountains they were taken up to 9,000 feet, which elevation also marked their upper limit on the Inyo Mountains. The extreme upper limit of the piñon pine coincides with the upper limit of their range. The nest is unusually small, and composed of sticks, brush, cacti, etc., piled in the crevices between rocks, or more rarely in thorny vegetation."

Neotoma desertorum sola.

Neotoma d. sola Merr., Proc. Biol. Soc. Wash., 1894, p. 126. Elliot, Syn. N. Am. Mamm., 1901, p. 161.

17 Examples: 16 Mouth of the Cañada de las Uvas, 1 Castac Lake.

"This race was found occupying a narrow belt on the border of the San Joaquin Valley near Fort Tejon. At the mouth of the Cañada de las Uvas they occurred at the lower edge of the Oak Belt, the nests being placed among loose rocks on hillsides and the walls of cañons. They occupied a belt covering only 300 or 400 vertical feet."

Neotoma intermedia gilva.

Neotoma i. gilva Rhoads, Am. Nat., XXVIII, 1894, p. 70. Elliot, Syn. N. Am. Mamm., 1901, p. 162.

10 Specimens from Whitewater.

While resembling *N. intermedia* rather closely, the present race can be distinguished by its much paler tail. The examples were procured by Mr. Heller not far from the type locality, and may almost be regarded as topotypes. Of this race Mr. Heller says that "about Whitewater and the eastern slope of the San Bernardino Mountains this form was found commonly in nests placed in clumps of small tree-yuccas, *Yucca mohavensis*. About Burns Cañon they occurred as high as 6,500 feet."

Neotoma intermedia bella.

Neotoma i. bella Bangs, Proc. N. Eng. Zoöl. Club, 1899, p. 66.

25 Specimens: 11 Palm Springs (topotypes), 2 Whitewater, 6 Morongo Pass, 1 Burns Cañon, 1 Old Woman's Spring, 4 Oro Grande.

TEONOMA.

Teonoma cinerea acræa.

Teonoma c. acræa (misprinted *acraia*), Elliot, Pub. Field Columb. Mus., III, 1903, p. 247.

7 Specimens: 3 Hot Springs (type and topotypes), 1 Big Cottonwood Meadows, 1 Big Cottonwood Lakes, Mount Whitney; 2 Summit of the Inyo Mountains east of Lone Pine.

This seems to be a rather rare animal in the localities in which it was met, which fact accounts for the small number of specimens obtained, and it evidently inhabits only the higher parts of the mountains, being indeed an alpine form. Mr. Heller states that "it was not common about Mount Whitney, where it was found from 8,000 feet elevation to timber-line. About Big Cottonwood Lakes it was fairly numerous among granite boulders, where it lived in the crevices, no attempt at nest-building

being apparent. On the summit of the Inyo Mountains down to the limits of the limber pine, 8,000 feet, it occurred sparingly."

MICROTUS.

Microtus dutcheri.

Microtus dutcheri Bailey, Proc. Biol. Soc. Wash., 1898, p. 85. Elliot, Syn. N. Am. Mamm., 1901, p. 185.

46 Specimens: 6 Big Cottonwood Meadows (topotypes), 3 Big Cottonwood Lakes, 17 Whitney Meadows, 15 Whitney Creek, 5 Hot Springs.

"In the broad zones of the Sierras this is a very common mammal. It was found in every meadow, from those in the upper part of the Transition Zone to the Alpine ones above timber-line at 12,000 feet. The surface runways and tunnels were usually constructed about the clumps of dwarf willows growing in the meadows. In habits they were more diurnal than nocturnal at high altitudes." This species is conspicuous for its short tail, considering its rather large size, and the uniformity of the coloring in a fairly large series, only occasionally a reddish one being observed.

Microtus californicus.

Arvicola californicus Peale, U. S. Expl. Exp. Mamm., 1848, p. 46.

Microtus californicus Elliot, Syn. N. Am. Mamm., 1901, p. 186.

21 Examples: 5 Fort Tejon, 11 Bailey's Ranch, near Fort Tejon; 5 Oro Grande.

"About the swamps near Fort Tejon and near the headwaters of Piru Creek, Bailey's Ranch, the California meadow mouse was abundant. The species also invades the desert, following the valley of the Mohave River as far as Oro Grande, or to the limit of damp meadows."

Microtus californicus vallicola.

Microtus c. vallicola Bailey, Proc. Biol. Soc. Wash., 1898, p. 89. Elliot, Syn. N. Am. Mamm., 1901, p. 186.

24 Specimens from Lone Pine (topotypes).

"In Owens Valley this species occurs abundantly along the river and about the streams as high as the Transition Zone."

Microtus mordax.

Microtus mordax Merr., N. Am. Faun., No. 5, 1891, p. 61. Elliot, Syn. N. Am. Mamm., 1901, p. 191.

1 Specimen Hot Springs, Mount Whitney.

I refer this example to this species, and it is the only one preserved by Mr. Heller in this region. He writes that it was "a rather rare species in the Sierras, where it was found from 8,000 to 12,000 feet elevation, or from the upper edge of the Transition to the Alpine Zone above timber-line."

THOMOMYS.

Thomomys operarius.

Thomomys operarius Merr., Proc. Biol. Soc. Wash., 1897, p. 215. Elliot, Syn. N. Am. Mamm., 1901, p. 223.

14 Examples from Keeler (topotypes).

"At Keeler this gopher is abundant on the borders of Owens Lake in moist soil supporting a heavy growth of salt-grass. The species is apparently restricted to this narrow zone which bounds the lake."

Thomomys fulvus.

Thomomys fulvus Woodhouse, Proc. Acad. Nat. Scien. Phil., 1852, p. 201. Elliot, Syn. N. Am. Mamm., 1901, p. 227.

4 Specimens: 1 Fort Tejon, 2 Bailey's Ranch, 1 north of Cañada de las Uvas.

"The moist borders of creeks near Fort Tejon and about Mt. Pinos are dotted with the mounds of this species. The badgers have hunted it so persistently in this region that it has become a very wary animal."

Thomomys perpallidus.

Thomomys talpoides perpallidus Merr., Science, VIII, 1886, p. 588.

Thomomys perpallidus Elliot, Syn. N. Am. Mamm., 1901, p. 229.

23 Specimens: 11 Palm Springs, 1 Whitewater, 1 Morongo Pass, 1 Warren's Well, 6 Oro Grande, 2 Daggett, 1 Copper City.

"In the irrigated fields at Palm Springs the desert gopher was abundant. Farther north on the Mohave River it was again met with about fields and along irrigating ditches at Oro Grande and Daggett."

Thomomys cabazonæ.

Thomomys cabazonæ Merr., Proc. Biol. Soc. Wash., 1901, p. 110.

10 Specimens: 7 Whitewater, 3 Banning (topotypes).

This seems to be the form common in the San Gorgonio Pass, and at the limit of its eastern range at Whitewater it overlaps that of *T. perpallidus*.

Thomomys alpinus.

Thomomys alpinus Merr., Proc. Biol. Soc. Wash., 1897, p. 216. Elliot, Syn. N. Am. Mamm., 1901, p. 229.

17 Examples, Mount Whitney region: 10 Big Cottonwood Meadows (topotypes), 3 Ramshaw Meadows, 3 Hot Springs, Long Cañon, 1 Whitney Meadows.

Misled by his specimens, Dr. Merriam says this species is "rather small," and gives a total length of 228 millimeters, when in fact it is a large species, attaining a total length of 270 millimeters, and is exceeded in size by only a few of the known species of the genus. "In the Boreal Zone of the Sierras it occurs abundantly in the heavy black loam of the wet meadows, and was taken from 8,000 feet elevation to the meadows above timber-line in the Alpine Zone. At timber-line the mounds were usually placed on dry gravelly hillsides."

Thomomys scapterus.

Thomomys scapterus Elliot, Pub. Field Columb. Mus., III, 1903, p. 248.

5 Specimens: 3 Hannopee Cañon (type and topotypes), 2 Coal Kilns, Panamint Mountains.

In the description of this form I gave the geographical distribution as the Panamint, Coso, and Inyo Mountains. Having examined and compared the examples since the publication of my paper, I am satisfied that the Coso and Inyo Mountain specimens should be referred to *T. a. perpes*, thus restricting *T. scapterus* to the Panamints.

Thomomys aureus perpes.

Thomomys a. perpes Merr., Proc. Biol. Soc. Wash., 1901, p. 111.

17 Examples: 1 Coso Mountains, 1 Summit of the Inyo Mountains east of Lone Pine 15 Lone Pine (topotypes).

This rather pale gopher was "abundant along the streams of the east slope of the Sierras in Owens Valley. About the shores of Owens Lake it meets *T. operarius*, and somewhere in the Transition Zone *T. alpinus* of the high Sierras." No specimens, however, were taken either in the Mount Whitney Region or in the Panamint Mountains, and it is reasonable to suppose it is not to be found to the eastward of the Coso and Inyo Mountains.

FAM. HETEROMYIDÆ.

Sub. Fam. Dipodomyinæ.

DIPODOMYS.

Dipodomys merriami nitratus.

Dipodomys m. nitratus Merr., Proc. Biol. Soc. Wash., 1894, p. 112. Elliot, Syn. N. Am. Mamm., 1901, p. 233.

16 Examples: 6 Keeler (topotypes), 10 Lone Pine.

"The sand dunes near Owens Lake in the vicinity of Keeler were perforated with the tunnels of this local form. As the animal recedes from the hot sandy shores of the lake, it becomes less reddish, and it is evident that the typical form does not extend more than fifteen or twenty miles from the shore line." Most of the mammals from this locality are characterized by greater depth of coloring than those from elsewhere, and specimens from Keeler or the lake are much richer in hue than specimens of the same species taken at a distance. These animals from the Owens Lake region exhibit in a striking degree the effects of environment upon color, and local *varieties* are produced, though without doubt the individuals are specifically the same as those living twenty miles away and which have a less ornate dress. But according to the custom of the day these variations must be dignified with a separate name, and they are in fact more easily recognizable among other specimens of the genus than many a one bearing a subspecific appellation, but which unhappily has no especial coloration to separate it from its fellows. In such cases *faith* has much to do with the determination. Some of the Lone Pine specimens are considerably paler than those from Keeler.

Dipodomys merriami simiolus.

Dipodomys m. simiolus Rhoads, Proc. Acad. Nat. Scien. Phil., 1893, p. 410. Elliot, Syn. Am. Mamm., 1901, p. 234.

Dipodomys m. similis Rhoads, Proc. Acad. Nat. Scien. Phil., 1893, p. 411. Elliot, Syn. N. Am. Mamm., 1901, p. 234.

54 Specimens: 20 Palm Springs (topotypes of *D. m. simiolus*), 12 Whitewater (topotypes of *D. m. similis*), 6 Morongo Pass, 4 Burns Cañon, 1 Warren's Well, 3 Old Woman's Spring, 2 Oro Grande, 1 Calico Mountains, 5 Daggett.

With so many topotypes of *D. m. simiolus* and *D. m. similis* from Palm Springs (Agua Caliente) and Whitewater, I do not

hesitate to place the latter name as a synonym of the former, for I cannot perceive the slightest difference, either in external appearance or cranial characters, between them. In the volume of the Proceedings of the Philadelphia Academy for 1893 both names appear, *simiolus* on page 410, and *similis* on page 411, thus giving the priority to *simiolus*. In Miller & Rehn's List it is stated that *similis* was published on January 27, 1894, and *simiolus* on January 30, 1894. This, of course, must have happened by the issue of independent leaflets to a few persons, but if one is to abide by the volume issued by the Academy and which is the Official Publication, the name *simiolus* must take precedence. The species appears to be an abundant one in the localities it frequents, and is found throughout the southern part of the Mohave Desert visited by Mr. Heller, to the vicinity of Daggett, north of which it does not seem to go, for no *Dipodomys* was met with until Ballarat was reached, near Death Valley, where the next race was found. In Mr. Heller's notes of this race, the following account is given: "An abundant anjmal throughout the Colorado and the southern portion of the Mohave Desert, from the lowest valleys to the middle limits of the Upper Sonoran Zone. This is the most abundant and widespread mammal of the desert, in which region it forms a large part of the food of the snakes, owls, carnivora, and Indians. In the lowest and hottest valleys it is less common than *D. deserti*. The burrows, which are few in number, are usually situated in sandy flats or gravelly mesas, often at the bases of spiny or thorny bushes, where they cannot be easily dug out by the larger carnivora. About the eastern end of San Gorgonio Pass they are abundant, but do not extend so far into the pass as the summit, apparently not ranging much farther east than Whitewater or Cabezon. On the eastern slope of the San Bernardino Range they ascend above 6,000 feet.

Dipodomys merriami mortivallis.

Dipodomys m. mortivallis Elliot, Pub. Field Columb. Mus., III, 1903, p. 250. Zoölogy.

7 Furnace Creek, Death Valley; 1 Ballarat.

"In Death Valley this form was not abundant, owing apparently to the salinity of the soil. Above the valley on gravelly mesas it occurred more commonly, and was also found in the vicinity of Ballarat in Panamint Valley. The range of this race does not seem to overlap that of *Perodipus panamintinus*, which

checks its vertical range at about 4,000 feet, the lower limit of the five-toed species. South of the range of *Perodipus panamintinus* the allied *D. m. simiolus* ranges up to 6,000 feet, where it enters the lower edge of the Piñon Zone."

Dipodomys deserti.

Dipodomys deserti Steph., Amer. Nat., XXI, 1881, p. 42. Elliot, Syn. N. Am. Mamm., 1901, p. 235.

40 Examples: 4 Palm Springs, 27 Daggett, 2 Ballarat, 7 Furnace Creek, Death Valley.

At Daggett, where most of the specimens were taken, this species was "abundant in the white sand area of the river bed to which it is confined. In Death Valley it was abundant everywhere about sandy soil and mesquite vegetation. Known locally as the mesquite-rat on account of the large quantity of mesquite-pods they store away in underground cavities. The Indians often dig open the burrows and gather their supply of pods from the rats, from which, after being ground into a flour, a yellowish bread is made."

Dipodomys deserti helleri.

Dipodomys d. helleri Elliot, Pub. Field Columb. Mus., III, 1903, p. 249.

6 Specimens from Keeler.

A richly colored race, similar in hue to *D. m. nitratus*, which was "common in the sand dunes a little beyond the margin of the grass, and evidently confined to a zone about the lake."

PERODIPUS.

Perodipus agilis.

Perodipus agilis Gambel, Proc. Acad. Nat. Scien. Phil., 1848, p. 77. Elliot, Syn. N. Am. Mamm., 1901, p. 236.

15 Specimens: 1 Banning, 1 Fort Tejon, 2 Bailey's Ranch, 8 Castac Lake, 3 Lockwood Valley, Mount Pinos.

"This species extends as far east as the summit of San Gorgonio Pass, where it was found near Banning, and the burrows were seen near Beaumont at the summit. In the Mount Pinos region it was common in the valleys and ravines, as high as the lower limit of the black pines or up to 6,000 feet altitude. They cross the Tehachapi Mountains in the vicinity of Fort Tejon, where they were found from the edge of the San Joaquin Valley eastward through the pass to Antelope Valley."

Perodipus agilis streatori.

Perodipus streatori Merr., Proc. Biol. Soc. Wash., 1894, p. 113. Elliot, Syn. N. Am. Mamm., III, 1903, p. 237.

10 Specimens: 2 North of Cañada de las Uvas, 3 Rose Station, 5 Neenach.

"An abundant race in the San Joaquin Valley in grain-fields near Rose Station at the mouth of the Cañada de las Uvas. At the western base of the Tehachapi Mountains they become smaller and darker, grading into *P. agilis*." In view of the fact just stated, it would seem that the proper status of this rat should be a subspecific one, instead of considering it entitled to specific rank as originally described.

Perodipus panamintinus.

Perodipus panamintinus Merr., Proc. Biol. Soc. Wash., 1894, p. 114.

18 Specimens: 12 Wild Rose Spring, Panamint Mountains, 3 Coso Mountains, 3 Lone Pine.

In color this form so nearly resembles *P. streatori* that it is difficult to distinguish them apart, but it has a shorter tail in the adult, and somewhat smaller measurements generally. "The stony mesas and creek washes on Telescope Peak in the Panamint Range were covered with the burrows of this rat. Their vertical range extended from 4,000 to 6,500 feet, which in this region coincided with that of *Coleogyne*, which forms a nearly pure growth at this altitude. The burrows were very numerous, a single rat usually living in a nest having a dozen or more tunnels, the mouths of which are connected on the surface by well-defined runways. In Coso Valley this form was again met in the *Artemesia* and *Coleogyne* vegetation. About Lone Pine it was fairly common at the base of the Sierras in *Artemesia* brush and in grain-fields. Much to my surprise the species was not found on the Inyo Range on the opposite side of the valley, both slopes of which were explored."

Sub. Fam. Heteromyinæ.

PEROGNATHUS.

Perognathus panamintinus.

Perognathus longimembris panamintinus Merr., Proc. Acad. Nat. Scien. Phil., 1894, p. 265.

Perognathus panamintinus Elliot, Syn. N. Am. Mamm., 1901, p. 245.

10 Specimens from Wild Rose Spring, Panamint Valley.

"The gravelly mesas near Wild Rose Spring, at the north end of the Panamint Range, supported large numbers of this pocket-mouse, which here outnumbered all other mammals in abundance. The range extended to the lower edge of the Juniper Belt, 6,500 feet, and down the eastern slope to about 4,000 feet, the species not occurring apparently in Death Valley. On the western slope of the range it descends to Panamint Valley, where it is fairly common."

Perognathus panamintinus bangsi.

Perognathus p. bangsi Mearns, Bull. Am. Mus. Nat. Hist., 1898, p. 300.

43 Specimens: 1 Castac Lake, 1 Bailey's Ranch, 9 Oro Grande, 5 Daggett, 3 Calico Mountains, 12 Copper City, 9 Lane's Mill, 3 Ballarat.

This race so closely resembles the preceding species that it is almost impossible to distinguish one from the other. Mr. Osgood (N. Am. Faun., No. 18, p. 29) says, "a convenient character to distinguish them is the color of the upper side of the tail, which is normally dusky in *panamintinus* and buffy in *bangsi*." Perhaps for many examples this rule will answer as well as any other, but there are a number of specimens which have dark tails from the same locality as those having buff tails, and then it becomes a good deal a matter of guesswork, unless one is willing to rely entirely upon the locality itself to determine the name of the specimen. Mr. Heller says of this race that "on the higher part of the Mohave desert on gravelly mesas supporting creosote bushes, this race is usually common. About Oro Grande and Daggett it was rare, but farther north in the vicinity of Pilot Knob it occurred so numerously that seventy-five per cent of the traps set contained this form. The burrows were invariably placed beneath the roots of creosote bushes in this locality. A single specimen was secured as far north as Coso Valley. At Antelope Valley the race ranges westward from the Mohave, and crosses the divide, occurring as low down as Fort Tejon, where, however, it is rather uncommon. It also occurs on the west slope of the mountains at Bailey's Ranch on Piru Creek."

Perognathus longimembris.

Perognathus longimembris Coues, Proc. Acad. Nat. Scien. Phil., 1875, p. 305. Elliot, Syn. N. Am. Mamm., 1901, p. 247.

16 Specimens: 15 Rose Station, near Fort Tejon (topotypes), 1 Neenach.

"In the San Joaquin Valley this pocket-mouse occurs very abundantly in the grass-fields and dry plains. A few were secured at the base of the Tehachapi Mountains, at the mouth of the Cañada de las Uvas, but they apparently do not extend into the mountains as far as Fort Tejon, where only *P. p. bangsi* was secured. The pouches of most of the specimens taken contained the seeds of alfileria, *Erodium*." The young adult of this species is of quite a different color, and much darker and more olivaceous."

Perognathus pericalles.

Perognathus pericalles Elliot, Pub. Field Columb. Mus., III, 1903, p. 252.

2 Specimens from Keeler.

This beautiful little species was evidently quite rare, as the two examples secured were the only ones seen. It shows to a remarkable degree the influence exerted upon color that the neighborhood of Owens Lake exerts in producing the rich, deep cream buff hue of its pelage. It was found among the sand dunes at the edge of the lake, to which it appeared to be restricted.

Perognathus* elibatus.

Perognathus elibatus Elliot, Pub. Field Columb. Mus., III, 1903, p. 252.

9 Specimens from Lockwood Valley, Mt. Pinos.

This is a dark species, and was abundant in the locality in which the examples were taken, at an elevation of 5,500 feet, "on the eastern slope of Mt. Pinos in the Piñon Belt. It was found on gravelly soil supporting sage-brush, scrub-oaks, and piñon pines."

Perognathus monticola olivaceus.

Perognathus olivaceus Merr., N. Am. Faun., No. 1, 1889, p. 15. Elliot, Syn. N. Am. Mamm., 1901, p. 249.

6 Examples from the summit of the Inyo Mountains, east of Lone Pine.

I refer these specimens to the present race, although they are not by any means "bright cinnamon buff," as given by

*ἠλιβᾶτος the smooth breathing is misprinted on page 252 ἡλίβᾶτος the rough breathing.

Osgood, but olivaceous and black. According to Mr. Osgood's Monograph, they ought to be *magruderensis*, but great emphasis is placed by him upon the size of that race, and all these examples are considerably smaller than the measurements given, the largest being, total length, 181; tail vertebræ, 95; hind foot, 23, as compared with 198, 107, 26; and an average of the six before me would be much less than the dimensions of the selected specimens given above. In color they agree with Dr. Merriam's description fairly well. According to Mr. Heller, this form was common in sage-brush areas on the summit of the Inyo Mountains at 8,500 feet.

Perognathus formosus.

Perognathus formosus Merr., N. Am. Faun., 1889, p. 17. Elliot, Syn. N. Am. Mamm., 1901, p. 250.

71 Specimens: 8 Old Woman's Springs, 2 Victor, 12 Oro Grande, 11 Daggett, 2 Copper City, 7 Lone Willow Spring, 11 Wild Rose Spring, 4 Hannopee Cañon, 2 Ballarat, 12 Furnace Creek.

I refer all of this series to the present species, as they are all large individuals, with the hind foot measuring as high as 27 millimeters, the average, however, being probably about 25. The examples from Lone Willow Spring are the largest, averaging about 200 mm. in total length. The two specimens from Ballarat are of a reddish color different from all the others. Whether this is an individual variation, or characteristic of this locality, cannot be decided, as no more examples were taken at that place. Mr. Osgood considered some of his examples from the Panamints to be *magruderensis*, but in this series I am unable to distinguish more than one form. There is a variation in size, but this must be expected among individuals where so much depends upon the tail to determine the total length. The hind foot, however, varies but slightly in dimensions among them all. Mr. Heller writes of this species that "throughout the Mohave Desert this is the most abundant and widespread species of pocket-mouse. In the Death Valley region it occurs from the floor of the valley to a height of 7,500 feet on the Panamint Mountains, which carries it to the lower edge of the Piñon Belt. Rocky hillsides and cañon walls are the usual haunts of the species."

Perognathus mesembrinus.

Perognathus mesembrinus Elliot, Pub. Field Columb. Mus., 1903, p. 251. Zoölogy.

13 Specimens from Palm Springs.

"At the base of the San Jacinto Mountains, in the vicinity of Palm Springs, this form occurs fairly common on rocky mesas and about the mouths of the cañons."

Chætodipus.

Perognathus penicillatus.

Perognathus penicillatus Woodhouse, Proc. Acad. Nat. Scien. Phil., 1852, p. 200. Elliot, Syn. N. Am. Mamm., 1901, p. 252.

13 Specimens: 3 Palm Springs, 4 Whitewater, 2 Morongo Pass, 4 Oro Grande.

I refer these specimens to the present species, although they are much less in their dimensions, the largest being in total length, 185; tail, 103; hind foot, 23; another is 182, 99, 24. There is also a conspicuous black patch at the base of the whiskers, which Mr. Osgood states in his Monograph, p. 46, is absent in *penicillatus*. "This species inhabits the sandy flats and dry creek washes of the desert. They are especially abundant about sand dunes in the lowest parts of the desert, usually occurring wherever *Dipodomys deserti* is found. Some were secured above 3,000 feet."

Perognathus stephensi.

Perognathus stephensi Merr., Proc. Acad. Nat. Scien. Phil., 1894, p. 267. Elliot, Syn. N. Am. Mamm., 1901, p. 253.

3 Specimens, Mesquite Valley, northwest arm of Death Valley.

Two of these examples were taken near the edge of the valley and appear best to answer the description of the species, being a uniform pinkish and vinaceous buff, which is said to be the "left over winter pelage." The one taken near the middle of the valley is a deep, rich cream buff, very much the same color as *P. pericalles* from Keeler, but of course these specimens are much larger than the Keeler examples. I imagine this cream buff individual to be in the full summer dress, which view, if correct, would show that the seasonal pelages are very different. The species is so very rare, only two specimens besides these examples being in any collection, I believe, that no information about it has been gained. The three individuals before me were taken on the 1st and 2nd of May. Of the Mesquite Valley

Mr Heller writes that "the rarity of mammals was striking. At one camp we put out 100 traps and secured but three mice, the bait remaining untouched on the others. Nearly all the localities where we have trapped, one-third or one-half of the traps set will catch animals. Some of the bad luck can be attributed to the Panamint Indians, who trap all kinds of rats and mice in the valley for food. Their 'dead-falls' were seen about every clump of mesquites, and a single Indian, it is said, will catch daily seventy-five or more rats and mice for his family."

Perognathus fallax pallidus.

Perognathus f. pallidus Mearns, Proc. Biol. Soc. Wash., 1901, p. 135.

7 Specimens: 1 Whitewater, 3 Morongo Pass, 1 Victor, 2 Oro Grande.

These examples, apparently representing the species described by Dr. Mearns, from Mountain Spring, Coast Range, San Diego County, California, constitute a pale form of *fallax*. "About the lower slopes of the San Bernardino Range in the vicinity of Morongo Pass, this form was fairly common between the altitudes of 2,000 and 6,000 feet. They are not abundant in the Juniper Belt on sandy or gravelly mesas and hillsides."

Perognathus spinatus.

Perognathus spinatus Merr., N. Am. Faun., No. 1, 1889, p. 59.

4 Specimens, from Palm Springs.

This species was abundant at Palm Springs, but only the above individuals were preserved. It goes into the cañons for considerable distances.

Perognathus californicus dispar.

Perognathus c. dispar Osgood, N. Am. Faun., No. 18, 1900, p. 58. Elliot, Syn. N. Am. Mamm., 1901, p. 255.

5 Examples: 2 Hot Springs, Mt. Whitney, 1 Fort Tejon, 1 Bailey's Ranch, 1 north of Cañada de las Uvas.

"In the Sierra Nevada this sub-species was taken in the vicinity of Mt. Whitney in Long Cañon, the waters of which are tributary to Kern River. This locality is in the upper limits of the black pine, or Transition Zone, and apparently marks the upper range of the race, which is here rather uncommon. The specimens were all taken on open, rocky hillsides. Above Fort Tejon they were found on rocky hillsides, from the lower limits of the oak groves to the black pine timber, at 6,000 feet."

FAM. ZAPODIDÆ.

Sub. Fam. Zapodinæ.

ZAPUS.

Zapus trinotatus alleni.

Zapus t. alleni Elliot, Field Columb. Mus., 1898, p. 212. Zoölogy.

1 Specimen, from Hot Springs, Long Cañon, Mt. Whitney.

This was the only example of *Zapus* procured on the journey, and was taken at an altitude of 8,000 feet. It was apparently very rare in the southern Sierras.

FAM. ERETHIZONTIDÆ.

Sub. Fam. Erethizontinæ.

ERETHIZON.

Erethizon epixanthus.

Erethizon epixanthus Brandt., Mem. Acad. St. Petersb., 1835, p. 389, pls. 1, 9. Elliot, Syn. N. Am. Mamm., 1903, p. 265.

1 Specimen, Whitney Creek, Mt. Whitney.

"In the High Sierras, near Mount Whitney, many of the lodge-pole pines, *Pinus murrayana*, bear the characteristic scars due to the gnawing of the porcupine; but, notwithstanding the abundance of such signs, the animal is rare, and unknown to many of the cattlemen. Their food consists, apparently, largely of the bark of this pine, no other tree in the vicinity showing the scars. Their range corresponds fairly well with that of the lodge-pole pine, the scars occurring at all altitudes between 8,000 and 10,000 feet. The bark is usually gnawed at the base of the tree, on one side only, or just above the larger limbs, which are used as a resting-place by the animal as it works. On trees where the limbs are placed at convenient intervals, the bark is stripped for several feet, the strip usually having a width of five or six inches."

FAM. OCHOTONIDÆ.

OCHOTONA.

Ochotona schisticeps.

Ochotona schisticeps Merr., N. Am. Faun., No. 2, 1889, p. 11. Elliot, Syn. N. Am. Mamm., 1903, p. 267.

10 Specimens, Big Cottonwood Lakes, Mount Whitney.

"Coneys were found fairly common at timber-line, or a little above it, on the east slope of Old Mount Whitney, in the vicinity of Big Cottonwood Lakes. They usually inhabited rock jams or talus slopes in which the rocks were of large size; but they occasionally lived in the crevices of cliffs. The usual note is a sharp '*quank*' repeated three or four times rapidly and resembling closely that of the slender-billed nuthatch, but much more penetrating. At dusk the coneys were especially noisy and active, sounding their alarm notes without any provocation. Their light ashy colors harmonize perfectly with the light gray of the granite."

FAM. LEPORIDÆ.

LEPUS.

Lepus campestris.

Lepus campestris Bachm., Jour. Acad. Nat. Scien., Phil., 1837, p. 349. Elliot, Syn. N. Am. Mamm., 1901, p. 277.

1 Specimen, from Big Cottonwood Meadows, Mount Whitney.

"This hare ranges on the high meadows and stony hillsides in the vicinity of Mount Whitney, from 8,000 to 13,000 feet. Above timber-line their droppings were abundant on black, gravelly hillsides, where their light coloration is protective. In running, their movements consist of graceful stiff-legged leaps, like those of deer, and are quite different from the long, rapid leaps of the California jack rabbit."

SILVILAGUS.

Lepus laticinctus.

Lepus laticinctus Elliot, Pub. Field Columb. Mus., III, 1903, p. 254. Zoölogy.

10 Specimens: 2 Fort Tejon, 3 Castac Lake, 4 Oro Grande, 1 Lone Pine.

"An abundant species on the bottom lands of the Mohave River near Oro Grande, where it occurs in willow thickets and sage-brush. Farther down the river at Daggett a few were seen near the river in beds of *Atriplex* bushes. A cotton-tail was seen several times in Morongo Valley, which appeared to be this form." Common in the vicinity of Fort Tejon, where it ranges from the lower edge of the Chaparral Belt to the Black Pine Belt on Mount Pinos. A young one was taken at 8,000 feet in the Sierras near Kern River.

Lepus laticinctus rufipes.

Lepus l. rufipes Elliot, Pub. Field Columb. Mus., III, 1903, p. 254. Zoölogy.

9 Examples, from Furnace Creek, Death Valley.

"This race was common in the heavy growth of *Pluchea* bushes at the mouth of Furnace Creek, but was not noted elsewhere in the valley."

Lepus laticinctus perplicatus.

Lepus l. perplicatus Elliott, Pub. Field Columb. Mus., III, 1903, p. 255. Zoölogy.

7 Specimens: 1 Hannopee Cañon, Panamint Mountains, 4 Coso Mountains, 1 summit of the Inyo Range, east of Lone Pine, 1 Hot Springs, Mount Whitney.

"On the Panamint Range this race was not rare in the Piñon and Juniper Zones from 7,000 to 10,000 feet, where the droppings were numerous. None were seen, however, above 8,000 feet. On the Inyo Mountains it was seen as high as 8,500 feet, but it was rare on this range. The brushy hillsides of the Coso Range supported a great many of this race at an elevation of about 5,000 feet."

Macrotolagus.

Lepus texensis deserticola.

Lepus t. deserticola Mearns, Proc. U. S. Nat. Mus., 1895, p. 564. Elliot, Syn. N. Am. Mamm., 1901, p. 291.

4 Specimens: 1 Whitewater, 1 Copper City, 1 Coal Kiln, 1 Lone Pine.

A common form in most parts of the desert, from the lowest valleys to the lower edge of the Boreal Zone. A few were seen at 9,000 feet on the summit of the Inyo Range, on slopes supporting a heavy growth of sage-brush, and on the Panamint Range their droppings were not uncommon at the same elevation. On the eastern slope of the San Bernardino Range they were seen as high as 8,000 feet. They are most abundant on the higher levels of the desert. At the mouth of Furnace Creek, in Death Valley, where food is abundant, they were not rare, contrary to the general rule. In the vicinity of Mt. Pinos they range at least as high as 6,000 feet on the eastern slope.

ORDER CARNIVORA.

FAM. CANIDÆ.

CANIS.

Canis lestes.

Canis lestes Merr., Proc. Biol. Soc. Wash., 1897, p. 25. Elliot, Syn. N. Am. Mamm., 1901, p. 301.

3 Specimens: 1 Whitney Creek, 1 Long Cañon, 1 Big Cottonwood Meadows, Mount Whitney.

I refer these three examples to this species, but without topotypes to compare with, the identification of a number of these coyotes is very unsatisfactory and uncertain. Mr. Heller says it is abundant in the high Sierras near Mount Whitney, from the Transition Zone to timber-line.

Canis estor.

Canis estor Merr., Proc. Biol. Soc. Wash., 1897, p. 31. Elliot, Syn. N. Am. Mamm., 1901, p. 302.

1 Specimen, from Neenach, Los Angeles County.

"Abundant in Antelope Valley, but throughout the drier parts of the Mohave they were seldom seen or heard. On the Panamint Mountains the tracks were seen as high as 6,000 feet."

Canis ochropus.

Canis ochropus Eschsch., Zoöl. Atlas, III, 1829, pp. 1–2, pl. II. Elliot, Syn. N. Am. Mamm., 1901, p. 303.

2 Examples, from Fort Tejon.

"In the vicinity of Fort Tejon this coyote was abundant, from the summit of the Tehachapi Mountains to the floor of the San Joaquin Valley. In the hilly country their food consists largely of juniper berries, wild cherries, and any edible berry native to the region."

VULPES.

Vulpes arsipus.

Vulpes arsipus Elliot, Pub. Field Columb. Mus., III, 1903, p. 256.

6 Specimens: 4 Daggett, 1 Pilot Knob, 1 Wild Rose Spring.

Chiefly a resident of the Mohave Desert, where, in certain localities, it is quite numerous. "About the Mohave River near Daggett, the Swift, as it is locally known, is common and appears to replace the coyote largely. It usually lives in burrows on the level desert, or in the embankments of dry sand washes, in

small colonies or families. Farther north in the Panamint Range they are much less common and inhabit chiefly the higher levels above 2,000 feet. Tracks were seen in Antelope Valley, where they are said to be fairly common. The Swifts are often seen during the day sitting at the mouths of their burrows and are usually easily approached and shot. This sort of curiosity or stupidity leads them to speedy extermination in settled districts. Afoot they are much swifter and possess more endurance than the coyote, often being able to outrun trained greyhounds."

Vulpes necator.

Vulpes necator Merr., Wash. Acad. Scien., 1900, p. 664. Elliot, Syn. N. Am. Mamm., Append., 1901, p. 433.

4 Specimens: 3 Whitney Creek, 1 Ramshaw Meadows, all virtually topotypes, Mount Whitney.

These examples are all in the summer coat, having been taken in June and July. Two of them answer fairly well to Dr. Merriam's description of the species; the other two are entirely different, and if the skulls were missing they might be regarded as young, and one is; the other is that of an adult animal, although not very old. The nose, back of neck and dorsal region, throat and line down breast and abdomen, is black, with white hairs mixed on back and under parts; haunches sooty; sides of neck and body yellowish buff; fore and hind legs black for their entire length on the outer side, but with buff intermingled on part of the outside of the thigh; elbow inside deep buff; tail above buff at base, remainder gray; hairs tipped with black, beneath sooty, with buff intermingled; ears on outside black. While these specimens are so different from typical *V. necator*, they undoubtedly belong to that species, and were taken in the same locality as the most typical of the examples, Whitney Creek. They probably represent the midsummer coat, with most of the bright-colored fur absent. "This fox is fairly common in the Boreal Zone in the vicinity of Mount Whitney, where it occurs from 8,500 feet to timber-line. Most of the specimens were taken at 9,000 feet, at which elevation it is most abundant."

UROCYON.

Urocyon cinereo-argenteus inyoensis.

Urocyon c. inyoensis, Elliot, Pub. Field Columb. Mus., III, 1904, p. 268. Zoölogy.

3 Specimens, from the Inyo Mountains.

A very pale form of *U. cinereo-argenteus*, allied to *U. c. californicus*, but with only a slight amount of black on the back, like *U. cataline*, but very much paler than that species in all its coloration.

FAM. PROCYONIDÆ.

PROCYON.

Procyon lotor hernandezi.

Procyon l. hernandezi Wagl. Isis, 1831, p. 514.

2 Specimens: 1 Palm Springs, 1 Oro Grande.

"At the east base of the San Jacinto Range this species is common on the edge of the desert in the vicinity of Palm Springs. On the Mohave River tracks were seen as far down as Daggett. The absence of the raccoon in Owens Valley is inexplicable."

FAM. MUSTELIDÆ.

TAXIDEA.

Taxidea taxus.

Taxidea taxus Schreib. Säugeth., III, 1778, p. 520.

1 Specimen, from Antelope Valley near Neenach.

"Near Wild Rose Spring in the Panamint Range, badger tunnels were not rare among the colonies of *Perodipus*, but the Indians and miners report them as rare. They are occasionally taken on the desert near Morongo Valley. In Antelope Valley they are said to be rare."

MEPHITIS.

Mephitis platyrhina.

Chincha platyrhina Howell, N. A. Faun., No. 20, 1901, p. 39.

1 Specimen, from Lone Pine.

A single example was taken near the eastern base of the Sierras. "It occurs along the streams entering Owens Valley from the west and also along Owens River."

Mephitis occidentalis holzneri.

Mephistis o. holzneri Mearns, Proc. U. S. Nat. Mus., XX, 1897, p. 461.

3 Specimens, from Oro Grande.

I refer these examples to this species. The animals were very abundant at Oro Grande, especially along the Mohave River. This, I believe, is the first desert record for this species,

east of the mountains. The hind foot is remarkably short for the size of the animals, this member measuring in two females 61 and 65 mm., respectively.

SPILOGALE.

Spilogale gracilis.

Spilogale gracilis Merr., N. Am. Faun., No. 4, 1890, p. 12. Elliot, Syn. N. Am. Mamm., 1901, p. 330.

6 Specimens, from Beveridge Cañon, Inyo Mountains.

These examples were taken at an elevation of 6,000 feet. They are also known to the Indians on the Panamint Mountains and are common in Owens Valley.

Spilogale phenax.

Spilogale phenax Merr., N. Am. Faun., No. 4, 1890, p. 15. Elliot, Syn. N. Am. Mamm., 1901, p. 331.

1 Specimen, from north of Cañada de las Uvas.

GULO.

Gulo luteus.

Gulo luteus Elliot, Pub. Field Columb. Mus., 1903, p. 260.

1 Example, Whitney Creek, Mount Whitney.

"The wolverine is rather a rare animal in the high Sierras, where it occurs from the lower part of the Boreal Zone to the meadows above timber-line. Occasionally in winter it is taken at the east base of the Sierras near Lone Pine. Near Ramshaw Meadows tracks of an adult and two young were seen ranging over a considerable extent of country. A few tracks were seen on the shore of an alpine lake above timber-line. Trappers located at Kern River Lakes a few years ago are said to have secured eight during the winter."

PUTORIUS.

Putorius xanthogenys.

Putorius xanthogenys Gray, Ann. Mag. Nat. Hist., 1843, p. 118. Elliot, Syn. N. Am. Mamm., 1901, p. 349.

2 Examples from Lone Pine.

"Not rare in Owens Valley at the east base of the Sierras and on the east slope of this range they ascend as high as 8,000 feet. One was killed at Monache Meadows during our stay, but the animal is seldom seen at this elevation."

ORDER INSECTIVORA.

FAM. SORICIDÆ.

SOREX.

Sorex montereyensis.

Sorex montereyensis Merr., N. Am. Faun., No. 10, 1895, p. 75. Elliot, Syn. N. Am. Mamm., 1901, p. 373.

5 Specimens, from Whitney Meadows, near Whitney Creek, Mount Whitney.

Three examples were taken at a height of 9,000 to 10,000 feet, and all exhibit the light summer pelage.

Sorex ornatus.

Sorex ornatus Merr., N. Am. Faun., No. 10, 1895, p. 79. Elliot, Syn. N. Am. Mamm., 1901, p. 374.

4 Examples: 3 Bailey's Ranch, near Fort Tejon, 1 Fort Tejon.

These are in the summer pelage and the "dark rump patch," mentioned by Dr. Merriam, is not visible. "Common on Pine Creek at 4,000 feet. Much rarer on Uvas Creek, near Fort Tejon."

NEOSOREX.

Neosorex palustris navigator.

Neosorex p. navigator Baird, Mamm. N. Am., 1857, p. 11. Elliot, Syn. N. Am. Mamm., 1901, p. 379.

13 Specimens: 6 Whitney Meadows, 7 Whitney Creek.

"Abundant about Whitney Creek at 9,000 feet, and on Whitney Meadows in swampy places."

ORDER CHIROPTERA.

FAM. VESPERTILIONIDÆ.

SUB. FAM. VESPERTILIONINÆ.

MYOTIS.

Myotis lucifugus longicrus.

Myotis l. longicrus Miller, N. Am. Faun., No. 13, 1897, p. 63. Elliot, Syn. N. Am. Mamm., 1901, p. 402.

2 Specimens, from Beveridge Cañon, Inyo Mountains.

Myotis yumanensis.

Vespertilio yumanensis H. Allen, Mon. N. Am. Bats, 1864, p. 58.

Myotis yumanensis Elliot, Syn. N. Am. Faun., 1901, p. 403.

2 Specimens: 1 Shepherd Cañon, Argus Mountains, 1 Rose Station, Fort Tejon.

Myotis californicus.

Vespertilio californicus Aud. & Bach., Journ. Acad. Nat. Scien. Phil., 1842, p. 20.

Myotis californicus Elliot, Syn. N. Am. Mamm., 1901, p. 403.

8 Specimens: 5 Hot Springs, Mount Whitney, 3 Fort Tejon.

"Abundant in the vicinity of Mount Whitney at 8,000 feet, where they seldom range above the Transition Zone. One of the commonest species in the vicinity of Fort Tejon. Many were seen at Wild Rose Spring on the Panamint Range."

Myotis californicus pallidus.

Myotis c. pallidus Steph., Biol. Soc. Wash., 1900, p. 153.

6 Specimens: 2 Mesquite Valley, Death Valley, 4 Wild Rose Springs, Panamint Mountains.

I refer these specimens to the race described by Mr. Stephens, as they seem to accord with his description, although the type locality is a considerable distance from those given above, and no specimens, so far as I am aware, have been taken in the intervening mountain ranges or desert country.

Sub. Fam. Antrozoinæ.

ANTROZOUS.

Antrozous pallidus.

Antrozous pallidus Le Conte, Proc. Acad. Nat. Scien. Phil., 1855, p. 437. Elliot, Syn. N. Am. Mamm., 1901, p. 396.

2 Specimens: 1 Coso Mountains, 1 Lone Pine.

"Abundant in some of the desert ranges. Near Ballarat, in the Panamints, they occurred about precipitous cañon walls. In the Argus Range many were seen at the mouth of Shepherd Cañon. In the Alabama hills near Lone Pine they were not uncommon."

Antrozous pallidus pacificus.

Antrozous p. pacificus Merr., Proc. Biol. Soc. Wash., 1897, p. 180. Elliot, Syn. N. Am. Mamm., 1901, p. 397.

3 Examples, from Fort Tejon.

"In the vicinity of Fort Tejon this bat is a rather rare species. Several were secured while I was stopping in an old house. The

bats could not be found in the house during the day, but at night they entered through the open windows, bringing with them large brown mole crickets, which they devoured at their leisure while suspended from the roof. The floor of the house below their perches was covered with the remains of the insects. At Surveyor's Wells, in Mesquite Valley, many of these bats were seen at dusk, drinking. About Furnace Creek Ranch they were also common."

Myotis evotis.

Vespertilio evotis H. Allen, Mon. N. Am. Bats, 1864, p. 48.
Myotis evotis Elliot, Syn. N. Am. Mamm., 1901, p. 406.
1 Specimen, from Hot Springs, in Long Cañon, Mount Whitney. This was the only example seen on the entire journey.

PIPISTRELLUS.

Pipistrellus hesperus.

Scotophilus hesperus H. Allen, Mon. N. Am. Bats, 1864, p. 43.
Pipistrellus hesperus Elliot, Syn. N. Am. Mamm., 1901, p. 409.
23 Specimens: 2 Palm Springs, 1 Oro Grande, 4 Wild Rose Springs, Panamint Mountains, 2 Beveridge Cañon, Inyo Mountains, 1 Lone Pine, 1 Rose Station, near Fort Tejon, 9 north of Cañada de las Uvas, 3 Bailey's Ranch. (11 alcoholics.)
"The specimens from Wild Rose Spring are very pale in color and are nearest the typical style. "This is the most abundant bat in the west, where it occurs throughout the desert, from the lowest valley to the Transition Zone."

VESPERTILIO.

Vespertilio fuscus.

Vespertilio fuscus Beauvois, Cat. Peale's Mus., 1796, p. 14. Elliot, Syn. N. Am. Mamm., 1901, p. 410.
26 Specimens: 12 Hot Springs, Long Cañon, Mount Whitney, 5 Lone Pine, 9 Fort Tejon. (3 alcoholics.)
The examples from Fort Tejon are much darker than the rest, the young being almost black. There is, however, considerable variation observable in color among individuals of this species.

NYCTINOMUS.

Nyctinomus mexicanus.

Nyctinomus mexicanus Sauss., Rev. Zoöl., 1860, p. 283.
Nyctinomus mohavensis Merr., N. Am. Faun., No. 2, 1889, p. 25.

Nyctinomus brasiliensis Elliot, Syn. N. Am. Mamm., 1901, p. 417.

9 Specimens: 1 Palm Springs, 8 Fort Tejon.

"Common at Palm Springs, in Palm Cañon. At Fort Tejon several hundred were found living in the garret of one of the old buildings."

Nyctinomus femorosaccus.

Nyctinomus femorosaccus Merr., N. Am. Faun., No. 2, 1889, p. 23.

1 Specimen, from Palm Cañon, near Palm Springs (alcoholic).

"One was secured in Palm Cañon, near Palm Springs, in a mummified condition, impaled on a mesquite bush which overhung a pool of water where the bats came to drink." In this locality this species was associated with the one preceding. The flight of this bat is very swift, and it seems to be very rare, and is probably more a resident of Lower California, with its northern limit about the latitude of Palm Springs.

SAN SIMON CANON, NEAR SAN QUENTIN.

EAST FACE OF SUMMIT SAN PEDRO MARTIR PEAK.

2.

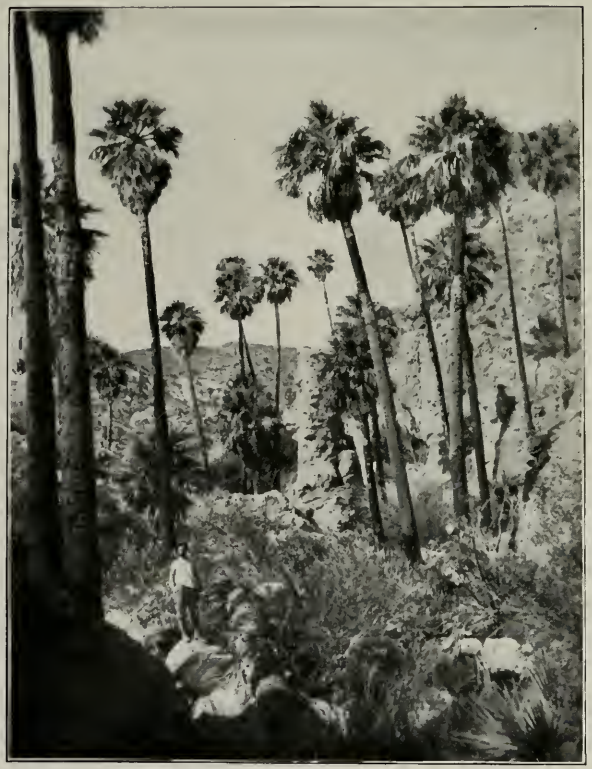
1. Camp at Vallecitos, 9,000 feet, San Pedro Martir Mountains.
2. La Grulla Meadows and Outfit, San Pedro Martir Mountains.

2.

1. Pack Train at Santa Rosa Meadows, San Pedro Martir Mountains.
2. Santa Eulalia. End of Pine Belt, San Pedro Martir Mountains.

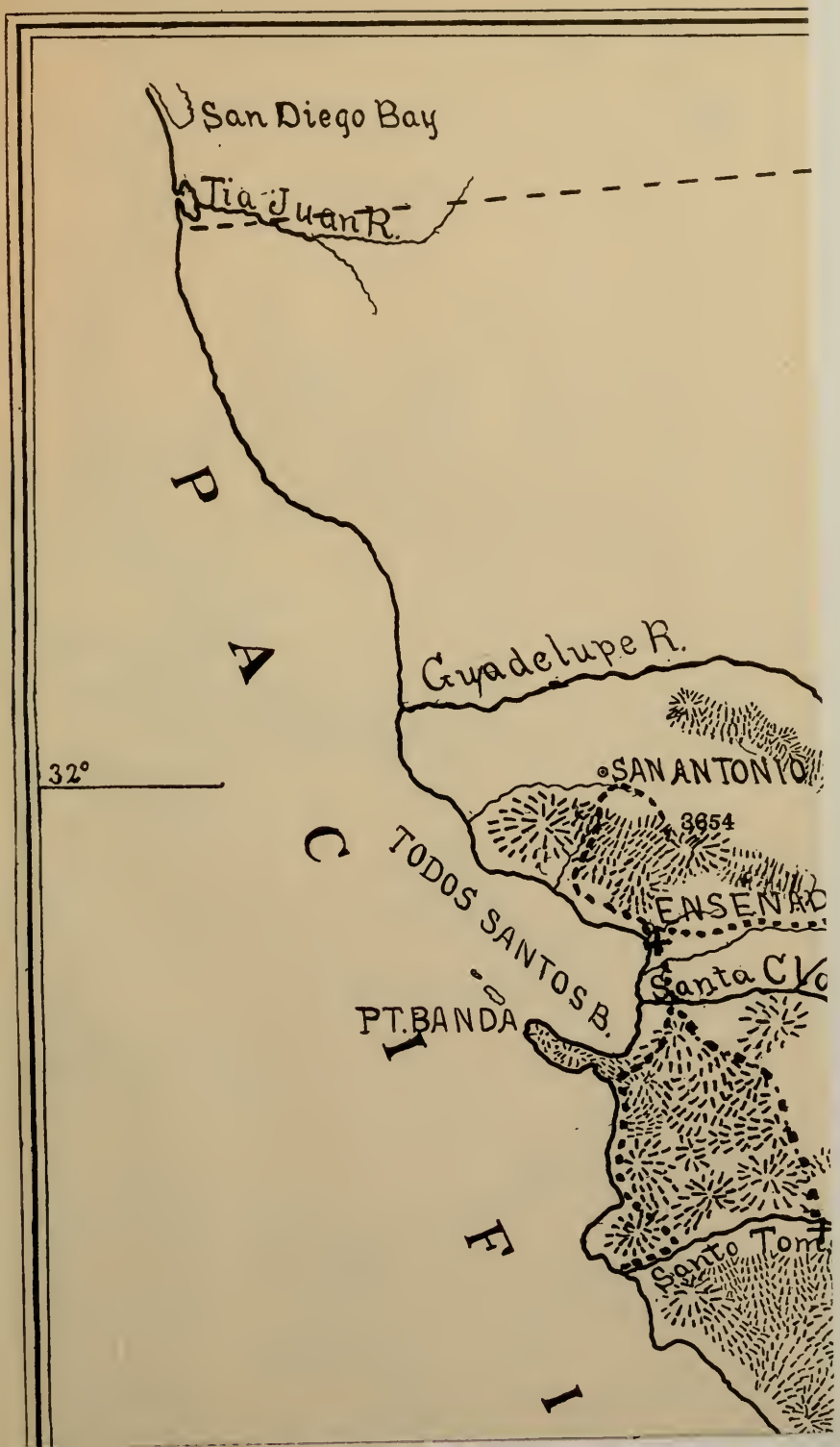
2.

1. San Pedro Martir Peak, 10,126 feet.
2. Odocoileus h. californicus and Hunter, Hanson Lagoon.



FAN PALMS IN AGUA CALIENTE CAÑON.
HANSON LAGUNA MOUNTAINS.

AGUA CALIENTE CAÑON.
HANSON LAGUNA MOUNTAINS.


San Diego Bay
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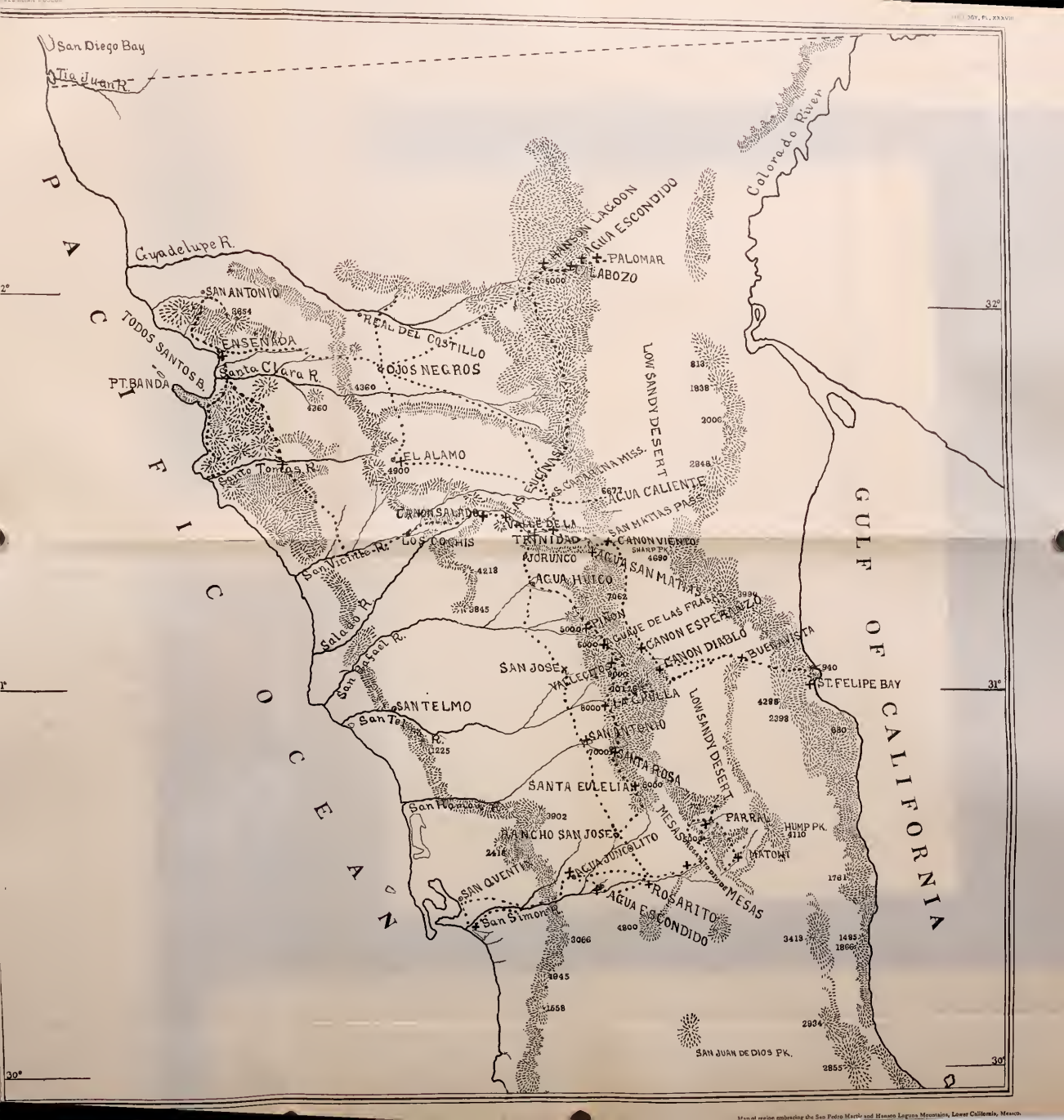
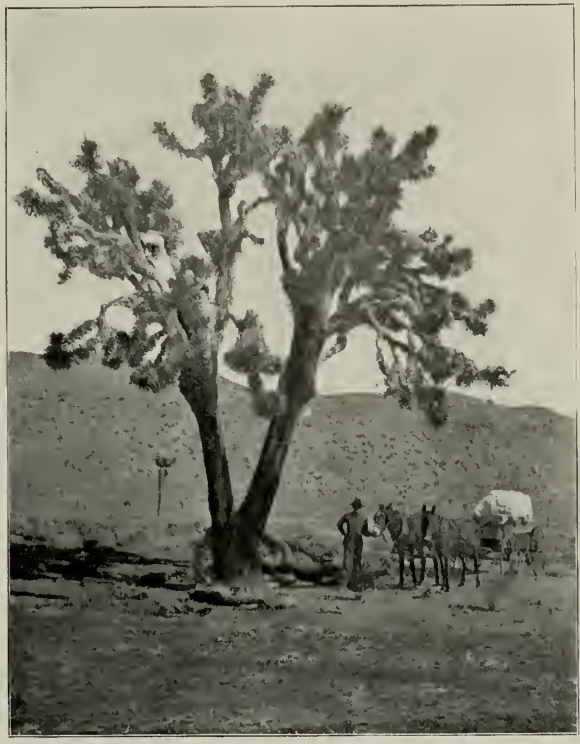
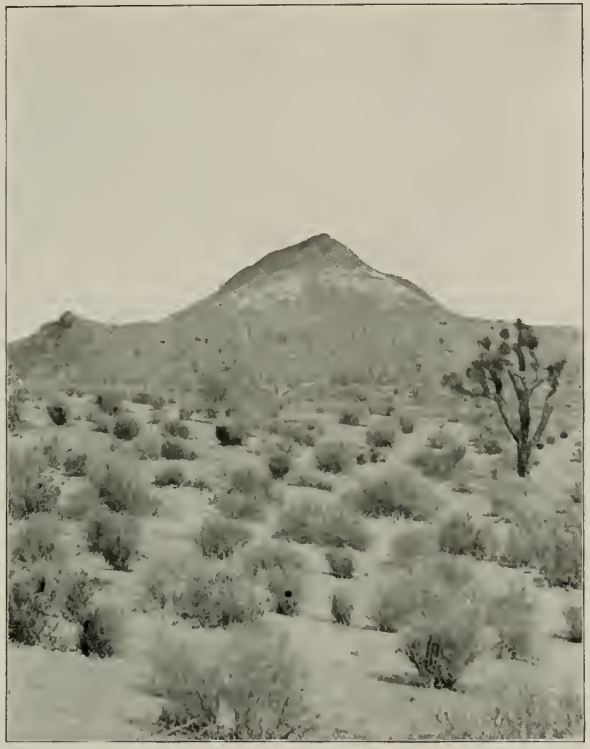


Map of region embracing the San Pedro Martir and Hanson Laguna Mountains, Lower California, Mexico.



2.

1. Tree Yucca, Palm Springs.
2. Fan Palms, Palm Springs.



2.

1. Pilot Knob, Mohave Desert.
2. Redrock Cañon, Mohave Desert.

2.

1. Wild Rose Spring, Panamint Mountains.
2. Ballarat. Panamint Mountains in Background.

2.

1. Coal Kilns, Panamint Mountains.
2. Indian Pictures, Emigrant Cañon, Panamint Mountains.

2.

1. Surface of Death Valley.
2. Furnace Creek, Death Valley.

2.

1. East Front, Mount Whitney.
2. Palisades Mount Whitney.

2.

1. Old Crater near Mount Whitney.
2. Timber-line, Mount Whitney.

2.

1. Mount Williamson, from the Summit of Mount Whitney.
2. Rock Creek, Mount Whitney.

2.

1. Monache Meadows, Orlando Peak in Background.
2. Sheep Mountain, near Mount Whitney.

2.

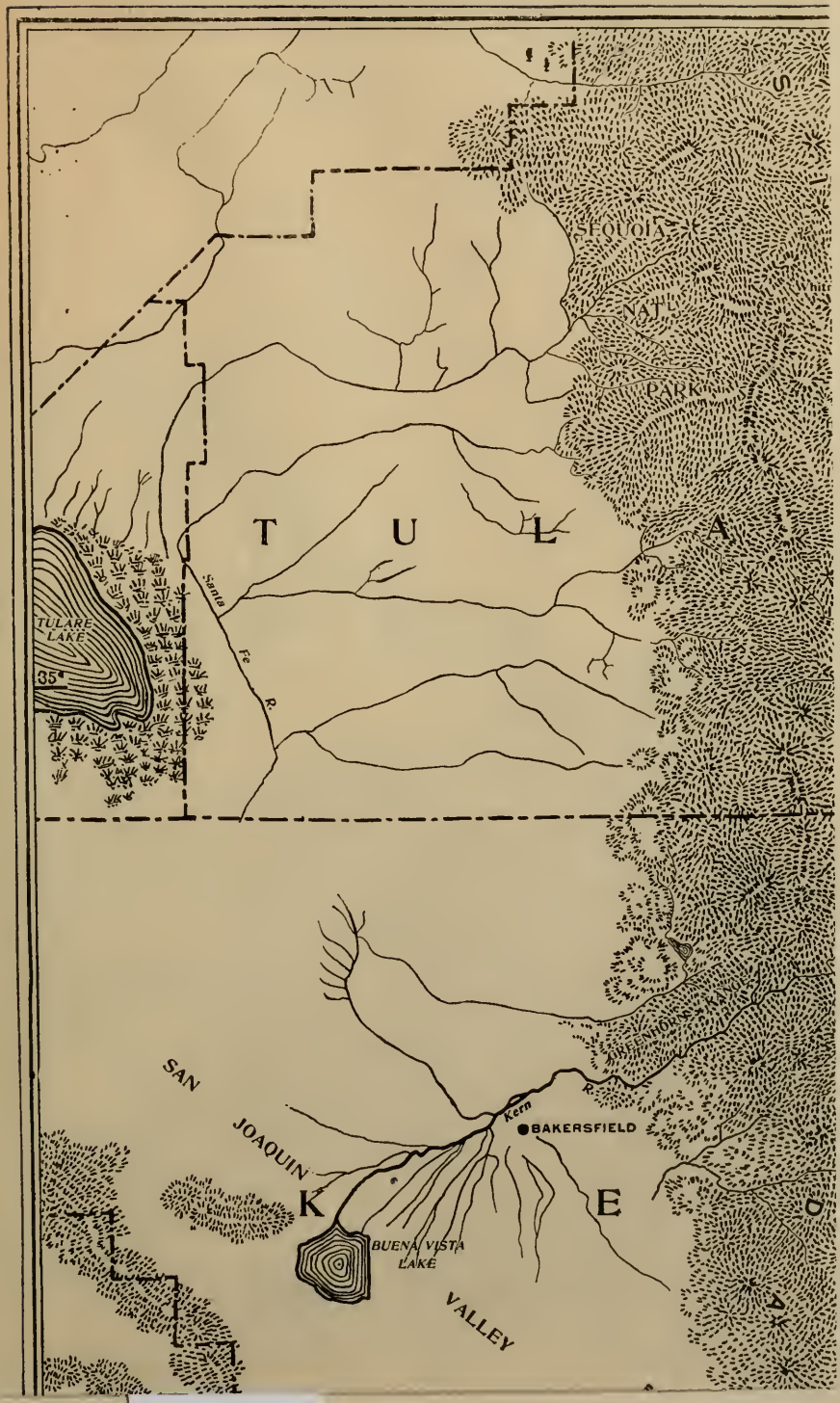
1. Cinder Cove, Little Owens Lake.
2. Mount Whitney, from Lone Pine.

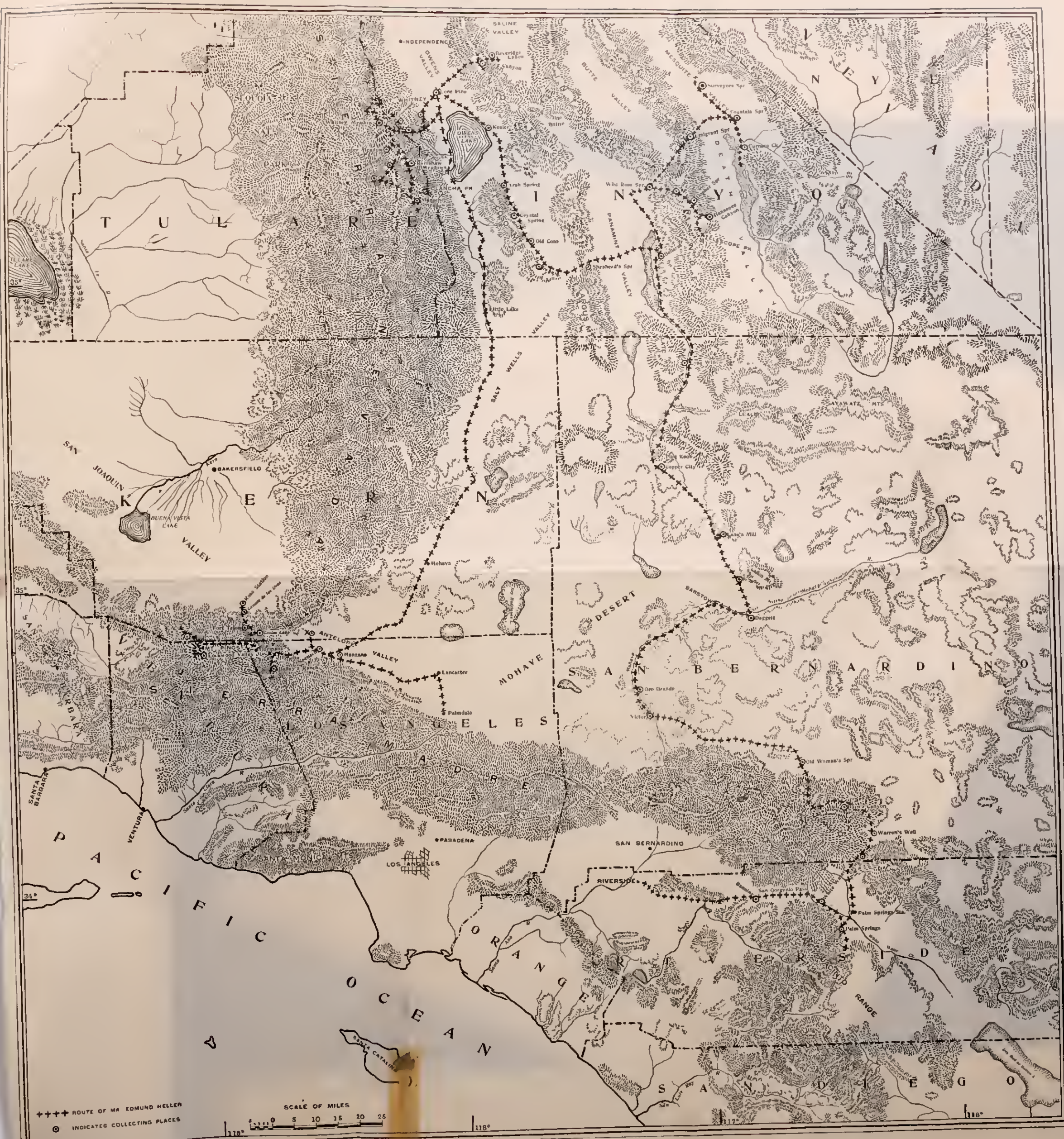
2.

1. Ingo Mountains, from Owens Valley.
2. The Sierras, from Middle of Owens Valley.

2.

1. Fort Tejon.
2. Antelope Rescued from Wolves, Antelope Valley.


SEQUOIA
NAT'L
PARK
T U L A
TULARE LAKE
35
Santa Fe R.
SAN JOAQUIN
K E
BUENA VISTA LAKE
VALLEY
Kern R.
BAKERSFIELD



INDEPENDENCE
SALINE VALLEY
OWENS VALLEY
Lone Pine
WHITNEY
OWENS LAKE
Keeler
BUTTE VALLEY
MESQUITE VALLEY
Surveyors Spr
Emigrant Spr
DEATH
Wild Rose Spr
Arab Spring
Crystal Spring
Old Coso
Shepherd's Spr
PANAMINT VALLEY
Little Lake
SALT WELLS VALLEY
T U L A R E
I N Y O
N E V A D A
S I E R R A N E V A D A
SAN JOAQUIN VALLEY
BAKERSFIELD
Kern
BUENA VISTA LAKE
K E R N
Mohave
Copper City
Lane's Mill
BARSTOW
Daggett
DESERT
MOHAVE DESERT
ANTELOPE VALLEY
Manzana
Lancaster
Palmdale
Oro Grande
Victor
S A N B E R N A R D I N O
L O S A N G E L E S
S I E R R A M A D R E
V E N T U R A
SANTA BARBARA
Santa Clara
Old Woman's Spr
Warren's Well
SAN BERNARDINO
RIVERSIDE
San Gorgonio Pass
Palm Springs Sta.
Palm Springs
PASADENA
LOS ANGELES
SANTA MONICA MTS
VENTURA
P A C I F I C O C E A N
SANTA CATALINA
O R A N G E
R I V E R S I D E
RANGE
S A N D I E G O
35°
34°
119°
118°
117°
116°
++++ ROUTE OF MR. EDMUND HELLER
⊙ INDICATES COLLECTING PLACES
SCALE OF MILES
0 5 10 15 20 25